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# COORDINATED PATENTS

TAORUI GUAN*

*As the United States and China compete ever more intensely for technological primacy in fields ranging from artificial intelligence to semiconductors, patent systems have emerged as an important factor shaping both nations' trajectories. In the United States, patents function largely as market-based tools to incentivize private R&D and guide competitive innovation. In contrast, China has instituted a distinctive "coordinated patent regime," weaving patents into a multi-layered framework of public subsidies, procurement preferences, tax measures, and regulatory advantages. This approach treats patents not merely as exclusionary rights but as mechanisms that channel both market forces and government resources, aiming to strengthen innovative capacity on a systemic scale.*

*Drawing on a comprehensive study of China's legal statutes, official policies, and available empirical studies, this Article systematically examines how the coordinated patent regime operates. Compared with the conventional market-based patent system, China's approach might be a more effective remedy for well-known market failures because it reduces early-stage barriers to innovation, guiding inventors across the "valley of death," while strengthening overall policy coherence. However, it also carries intrinsic risks. Overreliance on patent counts and the bundling of multifaceted incentives can skew resource allocation, encourage superficial or low-value patent filings, and dampen disruptive technological breakthroughs. The fact that the system's very strengths — such as top-down support and integrated governance — risk*

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*producing patent thickets and weakened market signals, raises questions about its capacity to maintain genuine inventive momentum.*

*Ultimately, these institutional choices hinge on how effectively China navigates the vulnerabilities of state resource allocation. If misapplied, the coordinated framework might transfer public-sector inefficiencies into the market domain, distorting the patent landscape rather than energizing it. In response, China faces two main reform options: "decoupling," which reduces government-led incentives in favor of a more market-oriented approach; or "upgrading," which retains existing structures but reinforces quality controls, evaluative metrics, and transparency. The implications of this study transcend the contexts of the US and China. They offer insights for jurisdictions worldwide that aspire to harness patents more effectively — whether through purely market-oriented approaches or through more integrated frameworks — to spur transformative innovation in an increasingly competitive environment.*

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## Introduction

Rivalry between the United States and China increasingly turns on questions of technological and innovative capacity,[1] with both nations vying for leadership in fields such as artificial intelligence, semiconductors, and biotechnology.[2] Far from a narrow contest over scientific prowess, this competition implicates broader choices about how societies generate, protect, and deploy valuable knowledge. Intellectual property systems,[3] particularly the patent regime,[4] have therefore

[1] *See* Piotr Grochmalski, Piotr Lewandowski & Pawel Paszak, *US-China Technological and for the Three Seas Initiative (3SI)*, 23 Eur. Rsch. Stud. J. (Special Issue 2) 840, 841 (2020) (describing the technological rivalry between China and the United States, and stating that a bipartisan consensus exists in the U.S. regarding the perception of China as a significant challenge to American technological supremacy); Andrew B. Kennedy & Darren J. Lim, *The Innovation Imperative: Technology and US–China Rivalry in the Twenty-Century*, 94 Int'l Affs. 553, 571–72 (2018) (noting that China's pursuit of technological innovation as a response to the "innovation imperative" has intensified its strategic competition with the U.S., particularly through its focus on acquiring and developing advanced technologies that challenge U.S. dominance).

[2] Robert Hart, *China Thrashes U.S. in Global AI Patent Race—Here's Why That Doesn't Mean It's Winning the AI War*, Forbes (July 4, 2024), https://www.forbes.com/sites/roberthart/2024/07/04/china-thrashes-us-in-global-ai-patent-race-heres-why-that-doesnt-mean-its-winning-the-ai-war/ [https://perma.cc/X525-VLX2] (noting that China leads the US in generative AI patent filings, holding 70% globally since 2014, which highlights the intensifying AI race between the two nations); Grochmalski, Lewandowski, & Paszak, *supra* note 1, at 841 (highlighting aspects of the US-China technological rivalry, particularly in the fields of Artificial Intelligence and semiconductors).

[3] Chamber of Com. of the U.S., IP Principles: Our Beliefs about Intellectual Property (Sep. 12, 2023), https://www.uschamber.com/intellectual-property/ip-principles-our-beliefs-about-intellectual-property [https://perma.cc/5TC6-2BYF] (emphasizing the critical role of strong intellectual property systems in maintaining its global leadership in technological innovation); Joseph R. Biden Jr., *A Proclamation on World Intellectual Property Day, 2021*, White House (Apr. 23, 2021), https://bidenwhitehouse.archives.gov/briefing-room/presidential-actions/2021/04/23/a-proclamation-on-world-intellectual-property-day-2021/ [https://perma.cc/H6QY-KSBR] (emphasizing that protecting intellectual property is vital for the growth and resilience of small businesses, which are key drivers of innovation and the U.S. economy); Xi Jinping (习近平), *Quanmian Jiaqiang Zhishi Chanquan Baohu Gongzuo Jifa Chuangxin Huoli Tuidong Goujian Xin Fazhan Geju* (全面加强知识产权保护工作激发创新活力推动构建新发展格局) [Comprehensively Strengthen Intellectual Property Protection Work to Stimulate Innovation Vitality and Promote the Construction of a New Development Pattern], 2 Xianfeng (先锋) [Pioneer] 4, 6 (2021) (emphasizing that innovation drives development and highlights the protection of intellectual property as crucial for safeguarding innovation and enhancing global competitiveness).

[4] U.S. National Science Foundation, *Global Competitors Outpace U.S. in Patents* (Feb 29, 2024), https://www.nsf.gov/nsb/news/news_summ.jsp?cntn_id=309184 [https://perma.cc/NE2H-AYYR] (highlighting the global competition in technological and innovative capacity, with China and the United States leading in patent filings and advancements in fields like artificial intelligence, semiconductors, and biotechnology); *see also* Xuan-Thao Nguyen, *Tech Supremacy: The New Arms Race between China and the United States*, 49 J. Corp. L. 103, 104,120 (2023).

emerged as a focal point in these debates. American policymakers repeatedly underscore their belief that patents lie at the core of economic growth, national security, and technological leadership,[5] while a growing body of evidence indicates that China is rapidly increasing the volume and sophistication of its own patent filings.[6] The recent assessments of organizations such as the Information Technology & Innovation Foundation (ITIF) warn that China could soon rival or surpass the United States in high-value innovation outputs.[7] In this charged milieu, patents — and the institutional arrangements that govern them — are more than legal artifacts: They represent crucial tools for advancing and securing each nation's broader strategic and economic objectives.

Against this backdrop, the United States and China have adopted markedly different philosophies regarding the structuring of their patent regimes. The U.S. model, long grounded in market-oriented logic, treats patents largely as mechanisms for encouraging private-sector R&D, and for disseminating technical information.[8] In contrast, China has developed a more comprehensive system,

[5] *See, e.g.*, Hank Johnson, *Inventing America Presents the U.S. Patent System: Promoting U.S. Job Creations, Competitiveness, and National Security*, HANKJOHNSON.HOUSE.GOV (Feb. 11, 2020), https://hankjohnson.house.gov/media-center/speeches/inventing-america-presents-us-patent-system-promoting-us-job-creations [https://perma.cc/3VQV-FL4J] (stating that "the patent system is a bedrock mechanism for incentivizing innovation in [the United States]," and plays a critical role in "job creation, competitiveness, and national security").

[6] Alexander Kersten, Gabrielle Athanasia, & Gregory Arcuri, *What Can Patent Data Reveal about U.S.-China Technology Competition?*, CTR. FOR STRATEGIC & INT'L STUD. (Sep. 19, 2022), https://www.csis.org/analysis/what-can-patent-data-reveal-about-us-china-technology-competition [https://perma.cc/TU2H-NJKJ] (noting that patent data reveals that China leads in global patent applications, particularly in strategic technologies like semiconductors and biotechnology).

[7] IAN CLAY & ROBERT ATKINSON, INFO. TECH. & INNOVATION FOUND., WAKE UP, AMERICA: CHINA IS OVERTAKING THE UNITED STATES IN INNOVATION CAPACITY (2023), https://itif.org/publications/2023/01/23/wake-up-america-china-is-overtaking-the-united-states-in-innovation-capacity [https://perma.cc/FS57-UP9V] (opining that China is close to surpassing the United States in terms of innovation output per capita, and calling on U.S. policymakers to develop a national economic and technology policy to restore U.S. dominance in innovation); *see also* ROBERT D. ATKINSON, INFO. TECH. & INNOVATION FOUND., UNDERSTANDING THE U.S. NATIONAL INNOVATION SYSTEM, 2020 (2020) [hereinafter UNDERSTANDING THE U.S. NATIONAL INNOVATION SYSTEM], https://itif.org/publications/2020/11/02/understanding-us-national-innovation-system-2020/ [https://perma.cc/7GKD-JHJ2] (contending that the U.S. must strengthen its innovation system to address declining federal investment and rising competition from China in the global race for technological and economic leadership).

[8] *See* Amy Kapczynski, *The Cost of Price: Why and How to Get beyond Intellectual Property Internalism*, 59 UCLA L. REV. 970, 974–75 (2012) (exploring Harold Demsetz's influential perspective that property

which leverages patents as pivotal nodes for orchestrating both state- and market-driven incentives.[9] This hybrid framework — here termed a "coordinated patent regime" — channels public subsidies, procurement advantages, tax breaks, and regulatory preferences through patent ownership, cultivating an approach that entwines market forces with substantial state involvement.[10] This presents a fundamental alternative to the predominantly market-driven regimes of Western economies.

Equally important, China's patent framework embodies a systemic perspective that integrates innovation incentives across multiple institutional domains.[11] Official policy statements from the central government echo this approach, emphasizing "comprehensive" or "coordinated" intellectual property management,[12] and calling for tighter linkages among fiscal, procurement,

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rights are a superior way to encourage investment in information because they "harness the power of price to transmit information between consumers and decentralized creators," and highlighting that this view is "so deeply internalized in the field of IP law that it is taken for granted"); *see also* William Hubbard, *The Debilitating Effect of Exclusive Rights: Patents and Productive Inefficiency*, 66 Fla. L. Rev. 2045, 2049 (2014) (noting that neoclassical economics, the dominant framework for assessing patent law, holds that while patents incentivize innovation and commercialization, they also enable price increases, and that when properly balanced, the market's "invisible hand" drives self-interested firms to maximize social welfare); Camilla A. Hrdy, *Commercialization Awards*, 2015 Wis. L. Rev. 13, 25 (2015) (noting that patents are the most efficient incentive mechanism by which to value unproven innovations while avoiding the risks of government intervention in specific industries); Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 Tex. L. Rev. 303, 327 (2013) (contending that under the patent system, the government defines the "ground rules," while the reward size is "based on the forces of supply and demand").

[9] *See infra* discussion Part II.

[10] *Id.*

[11] Guowuyuan Guanyu Yinfu "Shisiwu" Guojia Zhishi Chanquan Baohu He Yunyong Guihua de Tongzhi (国务院关于印发"十四五"国家知识产权保护和运用规划的通知) [Notice on Issuing the "14th Five-Year" National IP Protection and Utilization Plan], Guo Fa [2021] No. 20 (Oct. 9, 2021, effective Oct. 9, 2021) [hereinafter the "14th Five-Year" IP Protection and Utilization Plan] (identifying "systemic coordination" as a basic principle of IP governance and calling for a "systems mindset," interdepartmental coordination, central–local and interregional linkages, and "social co-governance" through the combined use of legal, administrative, economic, technological, and other policy tools).

[12] Guojia Zhishi Chanquan Zhanlue Gangyao (国家知识产权战略纲要) [National Intellectual Property Strategy Outline] (promulgated by the St. Council, June 5, 2008) St. Council Gaz., June 20, 2008 (China) [hereinafter 2008 Outline]; Zhishi Chanquan Qiangguo Jianshe Gangyao (2021-2035 Nian) (知识产权强国建设纲要(2021-2035年)) [Outline for the Construction of a Strong State of Intellectual Property (2021-2035)] (promulgated by the Cent. Comm. of the Chinese Communist Party and the St. Council, Sep. 22, 2021) St. Council Gaz., Oct. 20, 2021 (China) [hereinafter 2021 Outline] ("Establish a comprehensive, well-structured, and internally and externally coordinated legal system. Conduct foundational research on intellectual property laws, ensure the alignment of specialized laws and regulations, and enhance their

regulatory, and other policy tools to spur technological progress.[13] For example, China's *National Intellectual Property Strategy Outline* underscores the need to "deploy fiscal, financial, investment, government procurement, industrial … policies" in tandem in order to foster patent creation and use,[14] while the *"14th Five-Year" National Intellectual Property Protection and Utilization Plan* emphasizes the imperative of "systemic coordination."[15] These official pronouncements reflect a broader recognition — present in the scholarly discourse on "policy mixes" — that effective innovation governance demands more than isolated interventions.[16] As Borrás and Edquist contend, aligning multiple policy instruments allows governments to address the complex problems of the innovation system,[17] while Wieczorek and Hekkert note that this kind of strategy might better address "systemic weaknesses" at the innovation system level, providing a new policy rationale that replaces the older approach that merely addresses the neoclassical market failure.[18] China's coordinated patent system represents an institutional experiment rooted in this systemic ethos, one that aspires to unify diverse incentives but must also navigate the entanglements and uncertainties that such unification inevitably generates.

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applicability and consistency."). On December 5, 2016, China's president Xi Jinping emphasized the need to "carry out pilot reforms for comprehensive intellectual property management … streamline the entire chain of intellectual property creation, utilization, protection, management, and services, and establish an efficient comprehensive intellectual property management system …." *See Xi Jinping on Strengthening Intellectual Property Protection*, Hnswxcb (Nov. 28, 2019), http://www.hnswxcb.com/2019/11-28/63152.html [https://perma.cc/PWE3-4HKB].

[13] *See* 2021 Outline, *supra* note 12.

[14] *Id.*

[15] *See* "14th Five-Year" IP Protection and Utilization Plan, *supra* note 11.

[16] *See* Kieron Flanagan, Elvira Uyarra & Manuel Laranja, *Reconceptualising the 'Policy Mix' for Innovation*, 40 Rsch. Pol'y 702, 702 (2011) (pointing out that the term "policy mix," applied to innovation policy, highlights the interactions and interdependencies between policies in achieving intended outcomes).

[17] Susana Borrás & Charles Edquist, *The Choice of Innovation Policy Instruments*, 80 Tech. Forecasting & Soc. Change 1513, 1513 (2013). *See also* Edurne Magro, Mikel Navarro & Jon Mikel Zabala-Iturriagagoitia, *Coordination-Mix: The Hidden Face of STI Policy*, 31 Rev. Pol'y Rsch. 367, 367 (2014) (introducing the concept of "coordination-mix to address coordination failures in complex science, technology, and innovation policy settings, and highlighting a multi-layer dimension alongside existing multi-level and policy-mix frameworks).

[18] Anna J. Wieczorek & Marko P. Hekkert, *Systemic Instruments for Systemic Innovation Problems: A Framework for Policy Makers and Innovation Scholars*, 39 Sci. & Pub. Pol'y 74, 74 (2012) (noting that "systemic instruments" address "systemic weaknesses" at the innovation system level, providing a new policy rationale through which to address the neoclassical market failure).

Existing literature has examined facets of China's patent landscape — particularly issues of patent protection[19] and enforcement[20] — but has not engaged in a comprehensive, in-depth analysis of how China orchestrates its patent law and policy in parallel with fiscal, regulatory, and industrial measures to form a coordinated patent regime. Scholars have addressed coordination in innovation policy, yet have often confined their discussion to the combination of procurement and other policy tools,[21] without exploring how patents might synchronize with broader instruments. This gap is increasingly salient in light of data showing China's rapid increase in patent filings and its potential impact on global innovation.[22] Some critics point to shortcomings, such as questionable patent quality or overemphasis on numerical goals,[23] while others note the

[19] *See, e.g.*, Albert Guangzhou Hu & Gary H. Jefferson, *A Great Wall of Patents: What is Behind China's Recent Patent Explosion?*, 90 J. Dev. Econ. 57 (2009); Jianwei Dang & Kazuyuki Motohashi, *Patent Statistics: A Good Indicator for Innovation in China? Patent Subsidy Program Impacts on Patent Quality*, 35 China Econ. Rev. 137 (2015); Albert G.Z. Hu, Peng Zhang & Lijing Zhao, *China as Number One? Evidence from China's Most Recent Patenting Surge*, 124 J. Dev. Econ. 107 (2017).

[20] *See, e.g.*, Renjun Bian, *Patent Litigation in China: Challenging Conventional Wisdom*, 33 Berkeley Tech. L.J. 413 (2018); Brian J. Love, Christian Helmers & Markus Eberhardt, *Patent Litigation in China: Protecting Rights or the Local Economy*, 18 Vand. J. Ent. & Tech. L. 713 (2016); J. Benjamin Bai, Peter J. Wang & Helen Cheng, *What Multinational Companies Need to Know about Patent and Patent Litigation in China*, 5 Nw. J. Tech. & Intell. Prop. 449 (2007).

[21] Leif Hommen & Max Rolfstam, *Public Procurement and Innovation: Towards a Taxonomy*, 8 J. Pub. Procurement 17, 17 (2008); Elvira Uyarra & Kieron Flanagan, *Understanding the Innovation Impacts of Public Procurement*, 18 Eur. Plan. Stud. 123, 123 (2010); José Ángel Zúñiga-Vicente et al., *Assessing the Effect of Public Subsidies on Firm R&D Investment: A Survey*, 28 J. Econ. Surv. 36, 36 (2014).

[22] World Intellectual Property Organization, *World Intellectual Property Indicators 2023*, at 10, WIPO Publ'n No. 941EN/23 (2023) (reporting that in 2022, the IP office of China received 1.6 million patent applications, accounting for 46.8% of global filings, while the USPTO ranked second with 594,340 applications, representing 17.2% of the global total); World Intellectual Property Organization, *Global Innovation Index*, at 19, WIPO Publ'n No. 2000EN/23 (2023) (China's innovation progress is evident in its rise to 12th in the 2023 Global Innovation Index); Robert D. Atkinson, Info. Tech. & Innovation Found., China Is Rapidly Becoming a Leading Innovator in Advanced Industries 5 (2024), https://itif.org/publications/2024/09/16/china-is-rapidly-becoming-a-leading-innovator-in-advanced-industries/ [https://perma.cc/CU5G-L2A6] (reporting that over the past decade, China has become a globally competitive producer of advanced industries like telecom equipment, solar panels, and high-speed rail, while rapidly expanding its presence in emerging fields such as robotics, AI, and quantum computing, as evidenced by its growing share of advanced industries).

[23] *See* Kersten, Athanasia, & Arcuri, *supra* note 6 (noting that Chinese officials incentivize domestic patent applications, which results in data inflated to meet policy goals, evidenced by year-end filing surges and invention splitting to meet quotas).

country's growing technological influence on strategic industries.[24] Understanding the institutional and policy approaches behind these results matters both for China-watchers and for policymakers worldwide, including those in the United States who advocate a "national, coordinated innovation policy system."[25] By illuminating the logic and mechanisms of China's coordinated patent regime, this study offers insights not only into how one major economy structures its innovation policies, but also into the broader debates about whether — and how — to integrate patents with other policy levers for sustained technological growth.

This Article conducts a thorough investigation of China's coordinated patent regime, situating it within comparative law and economics frameworks, and informed by intellectual property scholarship, law-and-development theory, and institutional economics. In Part I, the paper scrutinizes the Anglo-American patent paradigm, tracing its evolution as a market-oriented model that grants inventors temporary exclusive rights to spur technological progress.[26] It examines how this traditional U.S. approach, while adept at mitigating free-rider problems and promoting private-sector R&D, largely operates in a decentralized environment where consumer demand and competitive pressures determine a patent's value.[27] This section also points out that conventional liberal market economies typically rely on patents as market-based incentives, even while deploying ancillary policy mechanisms like tax credits or prizes in a largely parallel fashion, without institutionally integrating these mechanisms into the patent framework.[28]

Part II shifts the focus to China's coordinated patent system, mapping its institutional contours, and examining the policy tools that align patents with an array of state-driven measures. Drawing on legal provisions, empirical research,

[24] *See* The Intelligence and Security Committee of Parliament, Press Notice 5 (2023) ("China is seeking technological dominance over the West and is targeting the acquisition of Intellectual Property and data in ten key industrial sectors – many of which are fields in which the UK has particular expertise."), https://isc.independent.gov.uk/wp-content/uploads/2023/07/ISC-China_Press-Release.pdf [https://perma.cc/ZHU6-4TBV]; Emma Farge, *China Leading Generative AI Patents Race, UN Report Says*, Reuters (July 4, 2024), https://www.reuters.com/technology/artificial-intelligence/china-leading-generative-ai-patents-race-un-report-says-2024-07-03 [https://perma.cc/Y5FR-9447] (indicating that China has taken the lead in the number of generative AI patents).

[25] Understanding the U.S. National Innovation System, *supra* note 7, at 23.

[26] *See infra* Part I.A.

[27] *See infra* Part I.A.

[28] *See infra* Part I.B.

governmental directives, and detailed policy documents, this section demonstrates how patents function as central nodes linking fiscal support, procurement preferences, regulatory benefits, and tax relief.[29] It reveals how such multifaceted incentives — ranging from direct subsidies for patent filings to favorable tax treatment — reflect a deliberate, top-down strategy that intersects with local experimentation. The result of this approach is a complex policy bundle in which patents serve not merely as instruments of market reward but also as gateways to a suite of state-backed resources, forming an integrated framework through which to cultivate China's technological development.

Part III offers a balanced assessment of how China's coordinated patent regime operates, outlining both its benefits and its drawbacks. On the one hand, this hybrid strategy might be more effective than conventional, market-oriented patent systems at closing well-documented market gaps, such as the so-called "valley of death" that obstructs the path from laboratory discovery to commercial product. By aligning multiple policy instruments, China's approach fosters a more cohesive set of incentives that guide inventors from initial research to market entry.[30] On the other hand, the same mechanisms that strengthen these channels can also produce unintended consequences. The layering of public subsidies and procurement preferences risks encouraging superficial filings and weakening the informative function of patents to signal true innovation potential.[31] Equally significant, these state-provided incentives can inadvertently create "patent thickets" that hinder subsequent innovation and dampen out-of-the-box technological breakthroughs by favoring incremental advances linked to official targets.[32]

Part IV then situates China's coordinated patent regime in a wider theoretical context and evaluates potential pathways for reform. Drawing on economic and policy frameworks — from institutional economics to principal-agent analysis — it posits that China's experience compels scholars and policymakers to rethink the ways in which the government's patent regime interacts with its overarching governance strategies. The incorporation of state-incentives into market-based mechanisms might bring the inherent limits of the state into the marketplace,

[29] *See infra* Part II.
[30] *See infra* Part III.A.
[31] *See infra* Part III.B.
[32] *See infra* Part III.B.

weakening its effectiveness in resource allocation.[33] Against this backdrop, the discussion posits two potential reform paths. A "decoupling" scenario, which would peel back the state-driven incentives built around patents, returning the system to a more market-oriented model.[34] This approach could lessen administrative distortions and stimulate investment rooted in genuine market demand.[35] Alternatively, an "upgrading" scenario would preserve the link between patents and governmental support but tighten quality standards, improve evaluation metrics, and heighten transparency, aiming to mitigate rent-seeking without relinquishing the underlying institutional coordination.[36]

In offering a richly documented and theoretically rigorous account of China's coordinated patent system, this Article contributes to multiple fields of scholarly inquiry. First, it expands the scope of patent law theory by revealing a previously overlooked dimension of patents as institutional "bridges" that link market forces with state-led strategic direction, challenging the traditional view of patents as purely market-based incentives.[37] Second, it enriches the study of innovation policy by, for the first time, systemically demonstrating how patents can integrate with other policy tools — such as subsidies, procurement preferences, regulatory benefits, and tax incentives — to create a comprehensive framework for mobilizing innovation, thereby advancing the understanding of policy synergy and its challenges.[38] Third, it broadens the literature on how latecomer countries can adapt their patent systems to overcome structural hurdles, offering practical

[33] *See infra* Part IV.A.

[34] *See infra* Part IV.B.

[35] *See infra* Part IV.B.

[36] *See infra* Part IV.B.

[37] Existing research generally posits that the patent system establishes basic rules, while the market forces of supply and demand determine the reward. *See, e.g.*, Hemel & Ouellette, *supra* note 8, at 327. Daniel J. Hemel & Lisa Larrimore Ouellette, *Innovation Policy Pluralism*, 128 Yale L.J. 544, 599 (2019) (pointing out that one essential characteristic of the IP system is that it serves as "an ex post, market-based innovation incentive").

Existing research has examined how patent and other innovation polices work, but has not explored the integration of these policies at the institutional level. Hemel & Ouellette, *supra* note 8; Michael Abramowicz, Prize and Reward Alternatives to Intellectual Property 350–375 (2019).

[38] Shoulin Pang, Shiting Dou & Huan Li, *Synergy Effect of Science and Technology Policies on Innovation: Evidence from China.*, 15 Plos one 1, 1 (2020) (exploring the synergy effect of government subsidies, tax incentives, and procurement on innovation); Marco Guerzoni & Emilio Raiteri, *Demand-side vs. Supply-side Technology Policies: Hidden Treatment and New Empirical Evidence on the Policy Mix*, 44 Rsch. Pol'y 726, 726 (2015) (providing empirical evidence that the combination of demand-side

lessons for other states seeking to strengthen their innovation ecosystems.[39] Finally, by comparing features of China's approach with the largely market-based Anglo-American model, the discussion enriches comparative institutional analysis, thereby enhancing the theoretical frameworks used to analyze divergent innovation systems.[40]

## I
## The Conventional Approach to Patents: The Market-Based Model

The U.S. patent system exemplifies a market-oriented strategy for promoting technological progress. At its core, it grants inventors time-limited exclusionary rights,[41] enabling those who succeed in developing valuable inventions to recover research and development costs, and earn a return proportionate to market demand.[42] This arrangement rests on the conviction that innovation flourishes in a

and supply-side policies, including subsidies and public procurement, leads to distinct innovative behaviors among firms).

[39] Flanagan, Uyarra, & Laranja, *supra* note 16; Guerzoni & Raiteri, *supra* note 38; Mariana Mazzucato, *Mission-Oriented Innovation Policy: Challenges and Opportunities*, 27 Indus. & Corp. Change 803 (2018).

[40] Irene Calboli, *A Call for Strengthening the Role of Comparative Legal Analysis in the United States*, 90 St. John's L. Rev. 609, 611–12 (2016); (suggesting that comparative legal analysis could play a larger role for U.S. intellectual property academics, and that more scholars should use it, in conjunction with other research methods, when studying intellectual property law because it allows them to incorporate the experiences of other jurisdictions into their research); Peter K. Yu, *A Half-Century of Scholarship on the Chinese Intellectual Property System*, 67 Am. U. L. Rev. 1045, 1121 (2018) (noting that "scholarship on the Chinese intellectual property system encourages researchers to think more deeply about the different justifications for and treatment of intellectual property rights in non-market economies").

[41] The Intellectual Property Clause of the U.S. Constitution states that Congress shall have the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." The patent system is intended to "promote the Progress of … useful Arts" "by securing for limited Times to … Inventors the exclusive Right to their respective … Discoveries." U.S. Const. art. I, § 8, cl. 8. *See also* Aleksandar Nikolic, *Securitization of Patents and Its Continued Viability in Light of the Current Economic Conditions*, 19 Alb. L.J. Sci. & Tech. 393, 411–12 (2009) ("A company that has a patent portfolio can exclude a larger proportion of competitors from practicing a larger proportion of inventions, potentially reaping greater royalties or infringement rewards."); Hemel & Ouellette, *supra* note 37, at 547 ("What is intellectual property (IP)? From the innovator's perspective, it is a set of rules that rewards producers of knowledge goods with temporary exclusive rights to their creations.").

[42] William Fisher, *Theories of Intellectual Property*, *in* New Essays in the Legal and Political Theory of Property 168, 169 (Stephen R. Munzer ed., 2001) (noting that by excluding competitors, creators can charge "substantially greater" prices for access to these products than they could in a competitive market); *see also* William M. Landes & Richard A. Posner, The Economic Structure of Intellectual Property Law 296 (2003) (noting that legal protection for patentees enable inventors to "charge a higher price than he

decentralized environment where competition,[43] rather than centralized planning, guides the direction of technological change. Within this framework, the market — manifested through consumer preferences, competitive pressures, and investor judgment — ultimately determines a patent's value.[44] While the United States also employs an array of ancillary measures, such as R&D grants, tax incentives, and prizes, to address specific market failures and foster certain areas of research,[45] these operate largely in parallel to the patent system, rather than as integrated components of it.[46] As a result, they do not fundamentally alter the market-driven character of patent incentives. Instead, these supplementary instruments remain comparatively light in touch and scope, allowing patents to remain the market-based mechanism that channels private initiative toward inventive activity.

### *A. Patents as Market Mechanisms*

The conventional Anglo-American tradition views patent law primarily as a market-oriented mechanism designed to incentivize private investment in innovation by granting inventors a temporary right to exclude others from practicing their inventions.[47] As Kenneth W. Dam, the former Deputy Secretary of the Treasury, once observed, patent law "creates property rights in order to

needs to recover the fixed costs of his invention"); Hemel & Ouellette, *supra* note 37, at 547 (noting that in an IP system, innovators receive a market-based reward for their inventions).

[43] Hrdy, *supra* note 8, at 25 (noting that patents are seen as the most efficient incentive mechanism for valuing unproven innovations while avoiding the risks of government intervention in specific industries); Hemel & Ouellette, *supra* note 8, at 327 (contending that under the patent system, the government defines the "ground rules," while the reward size is determined "based on the forces of supply and demand"); Hubbard, *supra* note 8, at 2049 ("Neoclassical economics, the dominant framework for assessing patent law, posits that while patents incentivize innovation and commercialization, they also enable price increases, and when properly balanced, the market's 'invisible hand' drives self-interested firms to maximize social welfare."); Ove Granstrand, *Towards a Theory of Innovation Governance and the Role of IPRs*, 69 Grur Int'l 341, 349 (2020) (contending that intellectual property rights facilitate "decentralized decision-making" by enabling trade and efficient resource utilization).

[44] See Landes & Posner, *supra* note 42, at 23–24 (using willingness to pay to infer that "the market values the bridge more than alternatives"); Christopher Buccafusco & Jonathan S. Masur, *Intellectual Property Law and the Promotion of Welfare*, *in* Research Handbook On The Economics Of Intellectual Property Law: Vol. 1 Theory 98, 102 (2019) (contending that "owners of IP can only realize these profits if individuals are actually willing to purchase their products and services").

[45] *See* Hemel & Ouellette, *supra* note 37, at 560–61 (explaining that in addition to patents, there are also ex ante funding methods—such as grants, tax incentives, and prizes—that share the goal of incentivizing innovation but operate based on different mechanisms).

[46] *See infra* Part II.B.

[47] *See supra* note 40.

allow a market system to function."[48] This foundational insight captures the essence of patents as instruments that enable inventors to recoup their research and development costs through the market,[49] rather than by relying on state direct intervention. Under this model, patents promote innovation not because the government can identify or command desirable technologies, but because it defines and protects enforceable property interests that inventors can trade, license, or otherwise leverage in competitive markets.[50] The basic logic is straightforward: By providing inventors with a time-limited monopoly, patents create a window during which they can charge higher than competitive prices or secure strategic advantages in the market, thereby ensuring that successful innovators reap sufficient returns on their investments.[51]

From an economic perspective, the legitimacy of patents as market mechanisms derives from the theory of public goods and the "appropriability problem."[52] Knowledge, unlike ordinary commodities, is non-rivalrous and non-

[48] Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. Legal Stud. 247, 248 (1994).

[49] Hemel & Ouellette, *supra* note 37, at 547 ("From the consumer's perspective, it is a set of rules that makes access to knowledge goods conditional upon the payment of a price above the marginal cost of those goods.").

[50] *See* Fisher, *supra* note 42; Steven L. Meltzer, Michelle S. Marks & James T. McCormick, *Intellectual Property as a Foundation for Funding*, 20 Nat. Biotechnol. BE47, BE48 (2002) (noting that intellectual property rights can keep "potential competitors out of your niche market while you reap the rewards of your innovation"); Jag Singh, "How Startups and SMEs Should Think About IP: An Investor's Perspective," WIPO (June 2021), https://www.wipo.int/wipo_magazine/en/2021/02/article_0006.html [https://perma.cc/A7VG-LJ6F] ("IP rights enable inventors and creators to transform their intellectual outputs into tradeable commercial assets."); Harald Wieser et al., *Leveraging Intellectual Properties for Start-up and SME Hypergrowth: Towards Holistic Support Services*, 14 Innova (2022), https://www.kmuforschung.ac.at/wp-content/uploads/2020/10/leveraging-ip-for-start-up-and-sme-hypergrowth_towards-holistic-support-services_09-02-2022-komprimiert.pdf [https://perma.cc/JX87-EEPT] (contending that IPRs help businesses to generate revenue by enabling product differentiation, market advantage, licensing opportunities, and protection against imitation).

[51] Hemel & Ouellette, *supra* note 37, at 560 ("The payoff to the innovator in the event of success is equal to the value of supracompetitive rents she can earn during the patent's life. For simplicity, we will refer to these as monopoly rents, although in practice many patents and other forms of IP do not offer monopoly power."); *see also* Fisher, *supra* note 42.

[52] Michael Peneder, *The Problem of Private Under-investment in Innovation: A Policy Mind Map*, 28 Technovation 518, 521, 528 (2008) (suggesting that innovation investment is often hindered by limited appropriability); Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 Calif. L. Rev. 1889, 1892 (2002) ("Intellectual creations are public goods that are much easier and cheaper to copy than they are to produce in the first place. Absent some form of exclusive right over inventions, no one (or not enough people) will bother to innovate.").

excludable: Multiple users can benefit from an idea without depleting it, and absent legal protection, others can freely imitate and profit from an original invention without bearing the initial R&D costs.[53] Without a mechanism for preventing uncompensated free-riding, private investors might underinvest in innovation, fearing that imitators will erode their returns.[54] Patents address this risk by granting inventors exclusive rights, allowing them either to commercialize the invention themselves without imitation or to license it to others at a premium.[55] Yet, as Buccafusco and Masur emphasize, "owners of IP can only realize these profits if individuals are actually willing to purchase their products and services," illustrating that the true value of a patent hinges on consumer demand in the market.[56] Economist Steven Cheung similarly notes that a patent's value ultimately depends on the "marketable product" that stems from the underlying invention,[57] implying that while the state defines the legal parameters of patent, the market itself determines the economic return.[58] Put simply, with the patent system, the government furnishes the legal scaffolding for invention, but market forces dictate which ideas ultimately succeed — and at what price.[59]

[53] Peneder, *supra* note 52, at 519; DAVID J. TEECE, MANAGING INTELLECTUAL CAPITAL: ORGANIZATIONAL, STRATEGIC, AND POLICY DIMENSIONS 15 (2000); *see* LANDES & POSNER, *supra* note 42, at 23–24 (indicating that since the cost of imitating an innovation can be low, free-riding competitors can compete with innovative firms at a much lower cost).

[54] Lemley, *supra* note 52, at 1892 ("Intellectual creations are public goods that are much easier and cheaper to copy than they are to produce in the first place. Absent some form of exclusive right over inventions, no one (or not enough people) will bother to innovate"); Jeanne C. Fromer, *Expressive Incentives in Intellectual Property*, 98 VA. L. REV. 1745, 1746 (2012) (noting that the dominant American theory holds that patent law prevents free-riding to ensure that creators have sufficient incentive to invest in valuable innovations).

[55] *See* Fisher, *supra* note 42; Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 131 (2004) (noting that IP law grants creators exclusive rights, enabling them to charge supracompetitive prices to incentivize creation, despite the fact that this limits some consumers' access).

[56] Buccafusco & Masur, *supra* note 44, at 102.

[57] Steven N. S. Cheung, *Property Rights and Invention Section I: An Introduction to the Economics of Patents and Copyrights*, 8 RSCH. L. & ECON. 5, 13 (1986).

[58] Hemel & Ouellette, *supra* note 8, at 327 (contending that "with the patent system, the government merely sets the ground rules (in terms of patentable subject matter, patent term, etc.), and the reward size is then based on the forces of supply and demand"); Hemel & Ouellette, *supra* note 37, at 560 (indicating that "market forces determine the size of the patent reward").

[59] *Id.*

Beyond their function in creating incentives, patents also serve critical informational roles.[60] By requiring detailed public disclosure of technical information in exchange for exclusivity, the patent system builds a readily accessible repository of knowledge.[61] This disclosure minimizes duplicative research and development, reduces costs for subsequent innovators, and promotes cumulative innovation.[62] Additionally, patents can act as signals in technology markets.[63] Investors, collaborators, and competitors often rely on patents as credible indicators of a firm's technological capabilities which reduces information asymmetries and guides resource allocation toward promising ventures.[64] This signaling function can be especially salient in fields like venture capital, where patent portfolios help inform investors of the startup's potential before committing investments.[65]

In practice, patents operate as market-shaping mechanisms in diverse ways across industries and technologies.[66] For example, in pharmaceuticals—where

[60] Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information*, 25 Harv. J.L. & Tech. 545, 547 (2012).

[61] Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 Harv. J.L. & Tech. 401, 424 (2010); Colleen V. Chien, *Contextualizing Patent Disclosure*, 69 Vand. L. Rev. 1849, 1852 (2016); Jason Rantanen, *Peripheral Disclosure*, 74 U. Pitt. L. Rev. 1, 6 (2012).

[62] This perspective views the patent system as a *quid pro quo*, where "inventors give up information to the public domain" in return for exclusive rights "to a technology," which they may use to "capture an income stream from the technology, block competitors, or gain bargaining leverage with other market actors." Clarisa Long, *Patent Signals*, 69 U. Chi. L. Rev. 625, 629 (2002). *See also* Landes and Posner, *supra* note 42, at 295 (noting that when the creator discloses the invention in the patent document, the public benefits by avoiding the need to duplicate efforts to develop the patented invention); Jeanne C. Fromer, *Patent Disclosure*, 94 Iowa L. Rev. 539, 542 (2009) (claiming that effective patent disclosures are intended to be detailed enough for inventors to "use them to culminate scientific and technological progress").

[63] Long, *supra* note 62, at 663; Stuart J. H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 Berkeley Tech. L.J. 1255, 1255 (2009); *see also* Ann Bartow, *Separating Marketing Innovation from Actual Invention: A Proposal for a New, Improved, Lighter, and Better-Tasting form of Patent Protection*, 4 J. Small & Emerging Bus. L. 1, 3 (2000) (noting that companies might seek patents primarily as a tool to enhance their marketing efforts and corporate image).

[64] Long, *supra* note 62, at 644–45 (noting that patents can act as signals to minimize information asymmetry between patent holders and external observers).

[65] Graham et al., *supra* note 63, at 1262 (noting that "patenting may play a previously underappreciated role in helping startups to secure investment from various sources of entrepreneurial capital, including not only angel and venture investors, but also 'friends and family' and commercial banks"); *see also* Mark A. Lemley, *Reconceiving Patents in the Age of Venture Capital*, 4 J. Small & Emerging Bus. L. 137, 144 (2000) ("We ought to be asking how venture capitalists and the venture capital community see patents…").

[66] Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 Va. L. Rev. 1575, 1580–95 (2003).

R&D costs are high, development timelines long, and imitation easy—patents are central to securing a return on risky investments.[67] In contrast, in rapidly evolving sectors like software and semiconductors, patents can function more strategically as bargaining chips for cross-licensing or as defensive shields against litigation, rather than as tools for outright market exclusion.[68] This heterogeneity highlights the adaptability of the patent system and underscores the difficulty of applying a one-size-fits-all approach to varied innovation landscapes.[69]

Admittedly, the market-based patent system faces significant challenges. Some commentators highlight its limitations in bridging the so-called "valley of death" in commercialization. While patents protect novel inventions and promote disclosure, they often fail to capture the risk, cost, and expertise necessary to bring an invention from prototype to market.[70] Some scholars, such as Ted Sichelman, have argued in favor of mechanisms that specifically address commercialization barriers that complement the current patent system.[71] Further, critics contend that market forces might undervalue technologies with significant positive externalities, such as technology aimed at addressing climate change,[72] since private returns cannot fully reflect the resulting social benefits.[73]

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[67] *Id.* at 1616–17.

[68] Coleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 307–10 (2010) (noting that in the software and semiconductor industries, companies have adopted strategies like defensive patenting and portfolio maximization, prioritizing quantity over quality to strengthen cross-licensing negotiations and achieve "patent peace," allowing them freedom to operate despite widespread infringement); Graham et al., *supra* note 63, at 1262 (noting that "patents are much less important as a means by which most software firms-the majority of which hold no patents-capture competitive advantage from their innovations").

[69] Michael W. Carroll, *One Size Does Not Fit All: A Framework for Tailoring Intellectual Property Rights*, 70 OHIO ST. L.J. 1361, 1404 (2009); Burk and Lemley, *supra* note 66, at 1630–38; Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific*, 17 BERKELEY TECH. L.J. 1155, 1156 (2002) ("Of late, however, we have noticed an increasing divergence between the rules themselves and the application of the rules to different industries. The best examples are biotechnology and computer software.").

[70] Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 343 (2010).

[71] *Id.* at 343–46.

[72] Rebecca Mandt, Kushal Seetharam & Chung Hon Michael Chang, *Federal R&D Funding: The Bedrock of National Innovation*, 1 MIT SCI. POL'Y REV. 44, 49 (2020) (noting that market forces often overlook technologies addressing climate change, necessitating federal intervention to drive innovation in clean energy and climate resilience).

[73] *See* Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 258 (2007) (suggesting that productive users' demand "often understates" societal value, and that property rights can distort resource allocation when private returns fail to reflect the full social benefits).

Despite these critiques, the foundational logic of a market-based patent system remains largely intact and influential. Over time, patent law has continually proven to be remarkably adaptable, evolving through case law, legislative reforms, and industry practices. The United States, for example, has gradually refined its doctrines governing patentable subject matter, non-obviousness, and infringement remedies so that they better calibrate incentives, and ensure a workable balance between exclusivity and access.[74] In addition, private ordering mechanisms—such as cross-licenses, patent pools, and standard-setting organizations—have emerged to mitigate transaction costs that today's intricate patent system poses.[75]

### *B. Patents and Other Innovation Incentives*

Although patents stand at the center of innovation policy, they rarely operate in isolation.[76] Given the complexity and diversity of innovative activity, no single policy mechanism can effectively correct all market failures or promote technological progress at every stage. [77] Advanced economies like the United States have assembled a portfolio of complementary policy measures — including R&D tax credits, direct government funding, and targeted innovation prizes — that work in parallel with the patent system.[78] These additional instruments can address market failures or specific phases of the innovation lifecycle that elude patent regimes.[79]

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[74] Burk & Lemley, *supra* note 66, at 1641–68; Burk & Lemley, *supra* note 69, at 1183–85.

[75] Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 Innovation Pol'y & Econ. 119, 119 (2000); Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 Calif. L. Rev. 1293, 1295 (1996) (patent pools); Lemley, *supra* note 52, at 1971 (standard setting).

[76] *See* Hemel & Ouellette, *supra* note 37, at 550 (outlining matching, mixing, and layering as ways IP and non-IP mechanisms coexist in innovation policy).

[77] Amy Kapczynski & Talha Syed, *The Continuum of Excludability and the Limits of Patents*, 122 Yale L.J. 1900, 1910–11 (2013) (contending that the debate over patents, prizes, and public funding highlights the trade-offs between private market rights for innovation incentives and the inefficiencies they create, underscoring the need for multiple policy tools); Hemel & Ouellette, *supra* note 37, at 612–13 (emphasizing that combining IP and non-IP mechanisms can address diverse challenges across the incentive and allocation spectrum more effectively than relying on a single policy tool); Joel Blit, *Are Patents Really Necessary?*, Ctr. for Int'l Governance Innovation (April 25, 2017), https://www.cigionline.org/articles/are-patents-really-necessary/ [https://perma.cc/9WZR-TBRL] (pointing out that "patents are in general less efficient in terms of overall welfare than many alternative mechanisms to incentivize innovation").

[78] Hemel & Ouellette, *supra* note 37, at 554; Hemel & Ouellette, *supra* note 8, at 316.

[79] Hemel & Ouellette, *supra* note 37, at 612–13 (emphasizing innovation policy pluralism, showing how IP and non-IP mechanisms address different aspects of incentives and allocation); Hemel & Ouellette, *supra*

Among these supplementary tools, research and development (R&D) tax credits have proven to incentivize innovation effectively.[80] Qualifying firms may offset a portion of their qualified R&D expenditures against their tax liabilities, thereby lowering the initial costs and risks of undertaking innovation.[81] In the United States, businesses can claim an R&D tax credit of 6-8% of qualifying expenses incurred by developing new products or intellectual property; eligible small or new businesses can accrue offsets against payroll tax up to $250,000 annually or $1.25 million over five years.[82] Unlike patents, which primarily reward success after an invention emerges, tax credits stimulate earlier-stage research, particularly in high-risk or foundational areas where payoffs can be distant or uncertain.[83] Empirical studies, including those by Hall and Van Reenen, consistently demonstrate that R&D credits tend to induce additional private investment on invention[84] at a one-to-one basis.[85] Other research suggests that tax incentives also generate positive spillover effects at other technologically related firms.[86] Some jurisdictions have even experimented with "patent box" regimes

note 8, at 307–10 (presenting a framework comparing patents, prizes, grants, and tax credits, and highlighting their roles in addressing different aspects of innovation); Blit, *supra* note 77 (arguing that while patents trade off deadweight loss for increased innovation, they are not always necessary or sufficient, and alternative mechanisms like prizes and direct funding can address limitations in the patent system).

[80] Bronwyn Hall & John Van Reenen, *How Effective Are Fiscal Incentives for R&D? A Review of the Evidence*, 29 Rsch. Pol'y 449, 449 (2000) (concluding that "a dollar in tax credit for R&D stimulates a dollar of additional R&D"); Nick Bloom, Rachel Griffith & John Van Reenen, *Do R&D Tax Credits Work? Evidence from A Panel of Countries 1979–1997*, 85 J. Pub. Econ. 1, 1 (2002) (finding that fiscal incentives, such as tax reductions, effectively increase R&D investment, with a 10% cost reduction leading to a short-term 1% rise and a long-term nearly 10% rise in R&D levels); Dominique Guellec & Bruno Van Pottelsberghe De La Potterie, *The Impact of Public R&D Expenditure on Business R&D*, 12 Econ. Innovation & New Tech. 225, 225 (2003) (noting that tax incentives on business-funded R&D have an immediate and positive effect).

[81] Hemel & Ouellette, *supra* note 37, at 557 (noting that refundable tax credits can be more effective than patents in high-risk, capital-constrained research scenarios, such as transformative battery technology).

[82] *R&D Tax Credit: What It Is and How to Claim It*, Adp, https://www.adp.com/resources/articles-and-insights/articles/r/r-and-d-tax-credit-what-it-is-and-how-to-claim-it.aspx [https://perma.cc/L8UT-CB99]; *see also* Hemel & Ouellette, *supra* note 8, at 321–26 (analyzing U.S. R&D tax incentives, including Section 174 and Section 41, and noting their role in increasing R&D spending).

[83] *See* Hemel & Ouellette, *supra* note 37, at 557 (suggesting that refundable tax credits can be more effective than patents in supporting high-risk research with capital constraints, as they incentivize earlier-stage efforts despite uncertain outcomes).

[84] *See* Bloom, Griffith & Van Reenen, *supra* note 80, at 1.

[85] Hall & Van Reenen, *supra* note 80, at 449.

[86] Antoine Dechezleprêtre et al., *Do Tax Incentives for Research Increase Firm Innovation? An RD Design for R&D* 3 (Nat'l Bureau of Econ. Rsch., Working Paper No. 22405, 2016),

that confer favorable tax rates on income derived from patented technologies; these initiatives may encourage the commercialization and retention of IP-intensive activities in addition to invention.[87]

Direct government funding constitutes another critical pillar of innovation policy.[88] Institutions like the U.S. National Science Foundation (NSF) and the National Institutes of Health (NIH) devote substantial resources to scientific research. Specifically, grants channel public funds into areas that are less amenable to private investment—such as fundamental physics[89] and high-risk technologies[90] —and fields with significant positive externalities like climate-related innovation.[91] Direct support can complement the patent system in complex ways. Empirical work by Pierre Azoulay and his co-authors shows that NIH-funded research contributes indirectly to commercial innovation: while less than 10% of NIH grants directly result in patents, over 30% produce research cited by them.[92] Thus, publicly funded science builds foundational knowledge that enhances private-sector R&D and extends the reach of the patent system.[93] However, the relationship between subsidies and patenting is not always linear or purely additive. As Guellec and Potterie show, moderate subsidies can crowd in private R&D by reducing firms' R&D costs and uncertainty, whereas poorly targeted or overly generous funding may displace business-financed R&D and crowd out investment..[94] The policy implication is careful calibration to avoid

https://www.nber.org/papers/w22405 [https://perma.cc/PR99-Q764] (finding that "the R&D induced by the tax policy generated positive spillovers on innovations by technologically related firms").

[87] Michael J. Graetz & Rachael Doud, *Technological Innovation, International Competition, and the Challenges of International Income Taxation*, 113 Colum. L. Rev. 347, 362 (2013).

[88] Hemel & Ouellette, *supra* note 8, at 320–21.

[89] *Physics*, U.S. Nat'l Sci. Found., https://new.nsf.gov/focus-areas/physics [https://perma.cc/5N75-Y242].

[90] *Smart and Connected Communities (S&CC)*, U.S. Nat'l Sci. Found., https://new.nsf.gov/funding/opportunities/scc-smart-connected-communities [https://perma.cc/DM2H-7SCJ].

[91] The NSF has allocated $3.5 million to civil infrastructure research aimed at developing transformative and equitable solutions for adapting to and mitigating climate change. *NSF Invests in Civil Infrastructure Resilient to Climate Change*, U.S. Nat'l Sci. Found., https://new.nsf.gov/news/nsf-invests-civil-infrastructure-resilient-climate [https://perma.cc/VWZ7-JKCS].

[92] Danielle Li, Pierre Azoulay & Bhaven N. Sampat, *The Applied Value of Public Investments in Biomedical Research. Science*, 356 Science 78, 78 (2017).

[93] *Id.*

[94] Dominique Guellec & Bruno van Pottelsberghe de la Potterie, The Impact of Public R&D Expenditure on Business R&D, OECD Sci., Tech. & Indus. Working Paper No. 2000/4, at 7

inefficiencies and preserve complementary private effort—for instance, by tying awards to additionality and performance in favor of across-the-board grants.

Innovation prizes, though less structurally integrated into the U.S. innovation ecosystem, attract increasing interest as a complementary or alternative mechanism to patent regimes.[95] Unlike patents, which award temporary exclusionary rights, prizes confer monetary rewards upon the achievement of specified technological objectives.[96] Notable examples include the Defense Advanced Research Projects Agency (DARPA) Grand Challenges[97] and the Ansari X Prize for private spaceflight.[98] Proponents argue that prizes can steer innovation more directly toward socially valued goals, while avoiding the deadweight losses associated with exclusive rights.[99] Nevertheless, the uncertainty inherent in the innovation process, combined with the difficulty of aggregating dispersed technological information, can complicate both the design and implementation of prize-based systems.[100]

(2000), https://www.oecd.org/content/dam/oecd/en/publications/reports/2000/06/the-impact-of-public-r-d-expenditure-on-business-r-d_g17a153d/670385851815.pdf

[95] *See, e.g.*, Nancy Gallini & Suzanne Scotchmer, *Intellectual Property: When Is It the Best Incentive System?*, 2 Innovation Pol'y & Econ. 51, 51 (2002) (noting that prizes and contract research are common alternatives to intellectual property for rewarding R&D efforts); Joseph E. Stiglitz, *Economic Foundations of Intellectual Property Rights*, 57 Duke L.J. 1693, 1719–24 (2008) (analyzing prizes and government-funded research as alternatives to the patent system).

[96] Hemel & Ouellette, *supra* note 37, at 553–55.

[97] *Innovation Timeline,* Def. Advanced Rsch. Projects Agency, https://www.darpa.mil/about/innovation-timeline [https://perma.cc/S7QK-TGDY].

[98] *Launching A New Space Industry*, XPRIZE, https://www.xprize.org/prizes/ansari [https://perma.cc/MX4Y-GHW3]; Mike Wall, *How SpaceShipOne and X Prize Launched Commercial Spaceflight 10 Years Ago*, Space.com (Oct. 4, 2014), https://www.space.com/27339-spaceshipone-xprize-launched-commercial-spaceflight.html [https://perma.cc/9X49-TPAP].

[99] Michael Abramowicz, *Perfecting Patent Prizes*, 56 Vand. L. Rev. 115, 122 (2003); Ben Depoorter & Peter Menell, Research Handbook on the Economics of Intellectual Property Law: Vol 1: Theory 373 (2019) (noting that "there are strong theoretical reasons that an ideal prize or reward system could dominate an ideal patent system because of the reduction of deadweight loss").

[100] Michael J. Burstein & Fiona E. Murray, *Innovation Prizes in Practice and Theory*, 29 Harv. J.L. & Tech. 401, 432–36 (2015) (noting that the challenges of government prizes arise from the inherent uncertainty and information asymmetries in the innovation process, so require flexible rulemaking, iterative adjustments, and mechanisms by which to aggregate and analyze dispersed information); Hemel & Ouellette, *supra* note 37, at 577 (noting that despite their best intentions, government officials might face difficulties in accurately adjusting reward sizes to reflect social value, due to the complex, dispersed, and ever-changing nature of the necessary information).

Government procurement policies, though not always framed as innovation incentives, have played a critical role in catalyzing technological advancement.[101] Defense-related procurement in the United States, for example, supported the early development of essential general-purpose technologies — computers, semiconductors, and the internet — by providing stable initial markets.[102] More recently, programs like the Small Business Innovation Research (SBIR) initiative integrate procurement with broader innovation goals by reserving a portion of federal R&D budgets for small, high-tech firms.[103] By 2019, the SBIR program had led to the issuance of 70,000 patents, the establishment of nearly 700 public companies, and around $41 billion in venture capital investments.[104] By creating a reliable initial demand for new products, these procurement programs reduce uncertainty for private innovators and spur investment in further development[105]— an approach that some research, including studies by Paul Geroski, suggests might be more effective than direct subsidies, particularly for technologies in earlier phases of the product life-cycle.[106]

The interplay between patents and these diverse policy instruments can be intricate and context dependent. As Hemel and Ouellette have documented, the U.S. government simultaneously employs multiple innovation incentives, including grants, prizes, tax benefits, and patents, reflecting the complexity of the portfolio.[107] In some instances, these tools work in tandem. For example, in the

[101] Bart Lenderink, Johannes I.M. Halman & Hans Voordijk, *Innovation and Public Procurement: From Fragmentation to Synthesis on Concepts, Rationales and Approaches*, 35 Innovation: Eur. J. Soc. Sci. Rsch. 650, 650 (2022).

[102] David C. Mowery, *Federal Policy and the Development of Semiconductors, Computer Hardware, and Computer Software: A Policy Model for Climate Change R&D?*, *in* Accelerating Energy Innovation: Insights from Multiple Sectors 159, 159–60 (2011).

[103] *About the Small Business Innovation Research Program*, U.S. Ctrs. for Disease Control and Prevention (Oct. 8, 2024), https://www.cdc.gov/technology-and-innovation/php/small-business-innovation-research/index.html [https://perma.cc/6GPB-DADW]; *see also* Albert N. Link & John T. Scott, *Government as Entrepreneur: Evaluating the Commercialization Success of SBIR Projects*, 39 Rsch. Pol'y 589, 589 (2010) (viewing government as an entrepreneur highlights its role in innovatively leveraging programs like the SBIR to reduce barriers and encourage R&D investment in small firms).

[104] U.S. Small Bus. Admin., SBA Financial Year 2019 Annual Report 101 (2019).

[105] Lenderink, Halman & Voordijk, *supra* note 101, at 662.

[106] P.A. Geroski, *Procurement Policy as a Tool of Industrial Policy*, 4 Int'l Rev. Applied Econ. 182, 196 (1990).

[107] Hemel & Ouellette, *supra* note 8, at 316–26.

pharmaceutical context, the *Bayh-Dole Act* integrates federally funded research with patent-based rewards, while programs such as Medicare Part D combine proprietary pricing with partial government subsidies, resulting in a mixed system in which market forces, public funding, and partial cost-sharing jointly drive innovation and influence access.[108]

Nevertheless, these various policy mechanisms typically operate in parallel to the patent system.[109] Patents, tax credits, subsidies, and prizes each target specific market failures, but lack the integration that a comprehensive overarching framework would provide.[110] Critics have pointed to the fragmentation that this approach can produce, arguing that more coherent and coordinated policy bundles might better harness the synergies among different instruments.[111] As Borrás and Edquist emphasize, "innovation policy instruments must be designed carefully and on the basis of an innovation system perspective," forming coherent policy mixes tailored to the complex problems of innovation.[112] They contrast this systemic approach to the reality that "in the everyday process of policy-making, many instruments are developed as a mere continuation of existing schemes, or with poor consideration of the expected effects," underscoring how a lack of system-based thinking can undermine the effectiveness of innovation policies.[113] Given this complexity, effective innovation policy might demand a dynamic, system-based approach that prevents the unending proliferation of separate mechanisms, and mitigates negative interactions among different instruments.[114] This perspective

[108] Hemel & Ouellette, *supra* note 37, at 596–99.

[109] Understanding the U.S. National Innovation System, *supra* note 7, at 23 ("There is no national, coordinated innovation policy system in the United States .... This reflects in part a belief that innovation is best left to the market, and that the role of government, to the extent there is one, is to support 'factor inputs,' such as knowledge creation and education.").

[110] Susana Borrás & Charles Edquist, Holistic Innovation Policy: Theoretical Foundations, Policy Problems, and Instrument Choices 2 (2019) (noting that "innovation policies remain skewed, unfocused, and limited").

[111] Hemel & Ouellette, *supra* note 37, at 596–99; Understanding the U.S. National Innovation System, *supra* note 7, at 23 (noting that the United States lacks a coordinated national innovation policy system, and that this approach is under pressure as other nations adopt comprehensive strategies to strengthen their innovation systems in response to evolving challenges, particularly from China).

[112] Borrás & Edquist, *supra* note 17, at 1513.

[113] *Id.* at 1513; Jakob Edler & Jan Fagerberg, *Innovation Policy: What, Why, and How*, 33 Oxford Rev. Econ. Pol'y 2, 9–10 (2017) (noting that literature emphasizes that effective innovation policy requires a systemic, holistic approach with coordinated efforts across government sectors).

[114] Flanagan, Uyarra & Laranja, *supra* note 16, at 710.

resonates with Mariana Mazzucato's concept of "mission-oriented" innovation policy, which advocates assembling robust portfolios of policy tools guided by clear societal goals, rather than relying on ad hoc, piecemeal interventions.[115]

## II
## A Coordinated Approach to Patents: The Market-State Hybrid Model

China's patent system exemplifies a more systematically coordinated approach[116] — one that diverges from the market-driven paradigms associated with the US.[117] This systemic emphasis on intellectual property is articulated in, and further reinforced by, China's recent policy pronouncements and strategic initiatives, which underscore the value of integrating diverse institutional components to foster more comprehensive reforms. For instance, in the CCP Central Committee's *Decision on Further Deepening Reform and Advancing Chinese-Style Modernization*, government authorities highlight "the transition from piecemeal experimentation and incremental breakthroughs to broad-based, systematic integration," with the aim of establishing "an efficient, comprehensive intellectual property management framework."[118] As a reflection of this philosophy, China uses legislative reforms and policy initiatives to interlace patent rights with a broad set of state-backed incentives — from direct funding and procurement preferences to regulatory support and tax relief — thereby forming an integrated framework of mutually reinforcing measures.[119] Within this

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[115] *See* Mazzucato, *supra* note 39, at 804 (noting that mission-oriented policies leverage frontier knowledge to address complex societal challenges through strategic, goal-driven innovation efforts that integrate diverse policy tools and long-term commitments); *What Is Mission-oriented Policy?*, OECD: Mission Action Lab, https://oecd-missions.org/key-topics/what-is-mission-oriented-policy/ [https://perma.cc/793V-GRYE] ("Mission-oriented policies are collaborative frameworks that mobilize resources, coordinate stakeholders across sectors, and integrate diverse policy tools to address bold societal challenges with clear, transformative objectives.").

[116] Zhonggong Zhongyang Guanyu Jinyibu Quanmian Shenhua Gaige Tuijin Zhongguoshi Xiandaihua de Jueding (中共中央关于进一步全面深化改革推进中国式现代化的决定) [Decision of the Central Committee of the Chinese Communist Party on Further Deepening Reform and Promoting Chinese-Style Modernization] (adopted by the Third Plenary Session of the 20th Central Committee of the Chinese Communist Party, July 18, 2024) (China) (emphasizing "greater focus on system integration," "adherence to a systematic approach," and "enhancing the systemic, holistic, and coordinated nature of reforms").

[117] *See supra* notes 39–42.

[118] *See supra* note 114.

[119] 2021 Outline, *supra* note 12 ("[P]romote the deep integration of IP with the economy, technology, culture, and society."); *see supra* note 11; *see infra* Part II.A–D.

framework, patents function not merely as instruments that provide incentives to motivate innovation activities, but also as strategic hubs for coordinating multi-layered governmental support. From the innovator's perspective, patents no longer promise only market-driven returns; they also unlock tiers of governmental backing, merging private and public rewards into a dual-source incentive structure.

### *A. Patent and Government Funding*

A defining characteristic of China's coordinated patent regime is its deliberate, system-wide linkage between patent rights and government funding. Through a range of legislative and administrative measures — particularly at the provincial and municipal levels[120] — Chinese authorities have integrated patents into a broad constellation of financial supports, including direct grants, commercialization subsidies, and risk-sharing mechanisms.[121] These policies seek to ease the steep financial hurdles facing firms that engage in costly and uncertain research and development (R&D),[122] mitigating initial outlays and fostering more predictable flows of capital.[123] Government funding thus elevates patents from mere instruments of market exclusivity to strategic levers for securing public-sector support.

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[120] Jiangsusheng Zhuanli Cujin Tiaoli (江苏省专利促进条例) [Regulations on Promotion of Patents in Jiangsu Province] (promulgated by the Standing Comm. Jiangsu Province People's Cong., Jan. 14, 2025, effective Jan. 14, 2025) (China) [hereinafter Jiangsu Patent Law], art. 12; Luoyangshi Zhuanli Cujin yu Baohu Tiaoli (洛阳市专利促进与保护条例) [Regulations on Promotion and Protection of Patents in Luoyang City] (promulgated by the Standing Comm. Luoyang City People's Cong., approved by the Standing Comm. Henan Province People's Cong., Nov. 29, 2012, effective Mar. 1, 2013) (China) [hereinafter Luoyang Patent Law], art. 9.

[121] Chen Jun (陈军) & Zhang Yunjun (张韵君), *Zhuanli Zizhu Zhengce Dui Qiyejia Zhuanli Yishi de Yingxiang—Yi Zhusanjiao Wei Li* (专利资助政策对企业家专利意识的影响—以珠三角为例) [The Impact of Patent Subsidy Policy on Entrepreneurs' Patent Awareness: A Case Study of the Pearl River Delta], 15(1) Hubei Jingji Xueyuan Xuebao [J. Hubei U. Econ.] 88, 89 (2017) (noting that government has adopted policies involving subsidies, special funds, rewards, interest-free loans, rent reductions, and venture capital to encourage enterprises to increase technological investment and generate more patentable outcomes).

[122] *See* Michael Kahn, Luiz Martins De Melo & Marcelo G. Pessoa de Matos, *The Financing of Innovation*, Financing Innovation 1, 2 (2020) (pointing out that innovation is characterized by lengthy development periods, significant uncertainty, and high risk, all of which make banks and markets reluctant to fund early-stage innovation).

[123] *See* Tuomas Takalo & Tanja Tanayama, *Adverse Selection and Financing of Innovation: Is There a Need for R&D Subsidies?*, 35 J Tech. Transfer 16, 16 (2010) ("First, the subsidy itself reduces the capital costs related to the innovation projects by reducing the amount of market-based capital required"); Chen Jun & Zhang Yunjun, *supra* note 121, at 89 (noting that patent subsidy policies help offset firms' R&D expenses through diversified government funding, reducing their research costs).

In practical terms, numerous local governments subsidize the cost of filing patent applications.[124] Since the issuance of the *National Medium- and Long-Term Plan for Science and Technology Development (2006–2020)*, local authorities have introduced performance metrics into their innovation policy frameworks.[125] Many regions have established dedicated funds that partially or fully cover patent application expenses.[126] These funding models vary, ranging from full coverage of documented costs to fixed-sum subsidies, to reimbursement up to predetermined limits.[127] For example, in Baotou, applicants receive a fixed subsidy of 5,000 yuan (approximately $700) per granted domestic invention patent, and 10,000 yuan (approximately $1,400) per granted international invention patent, subject to certain ceilings.[128] In addition, maintaining a patent for over a decade entitles the owner to a further 1,000 yuan (approximately $140).[129] Such arrangements contrast sharply with the user-pay norms prevalent in many market economies, effectively lowering entry barriers and encouraging a broader range of innovators to engage with the patent system.[130]

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[124] Dang & Motohashi, *supra* note 19, at 151 (summarizing subsidy programs in 29 provinces).

[125] Bao Jian (包健), *Zhongguo Zhuanli Shuishou Youhui Zhengce Fenxi* (中国专利税收优惠政策分析) [Analysis of China's Patent Tax Incentive Policy], 36(4) Kexue Guanli Yanjiu (科技管理研究) [Science Management Research] 85, 85 (2018).

[126] *See, e.g.*, Fuzhou Municipal Market Supervision Bureau, *Policy Interpretation of the Notice from Fuzhou Municipal People's Government on Adjusting Patent Subsidy Policies*, Fuzhou.gov (June 24, 2021), http://www.fuzhou.gov.cn/zgfzzt/scjgzf/scjggzhbz/202212/t20221208_4483841.htm. [https://perma.cc/88PX-E72U].

[127] Lin Deming (林德明) & Wang Chunjie (王春杰), *Difang Zhuanli Zizhu de Zhengce Fenxi yu Duice Yanjiu* (地方专利资助的政策分析与对策研究) [Policy Analysis and Countermeasure Research on Local Patent Subsidies], 36(24) Keji Guanli Yanjiu (科技管理研究) [Science and Technology Management Research] 26, 28 (2016); Chen Jun & Zhang Yunjun, *supra* note 121, at 89.

[128] Baotoushi Renmin Zhengfu Guanyu Yinfa Baotoushi 2023 Nian Tuidong Chanye Gao Zhiliang Fazhan Zhengce Qingdan de Tongzhi (包头市人民政府关于印发包头市2023年推动产业高质量发展政策清单的通知) [Notice of Baotou Municipal People's Government on Issuing the 2023 Policy List for Promoting High-Quality Industrial Development in Baotou City] (promulgated by the Baotou Municipal People's Gov't, Apr. 6, 2023, effective Apr. 6, 2023) (China), art. 110.

[129] *Id.*

[130] *See, e.g.*, U.S. Patent and Trademark Office, *USPTO Fee Schedule*, Uspto.gov, https://www.uspto.gov/learning-and-resources/fees-and-payment/uspto-fee-schedule; European Patent Office, *Schedule of Fees*, my.epoline.org, https://my.epoline.org/epoline-portal/classic/epoline.Scheduleoffees.

Beyond initial filing costs, policymakers have introduced funds explicitly designed to promote the commercialization of patented technologies.[131] For instance, Jiangsu Province established a dedicated patent implementation fund[132] that provides at least 200,000 yuan (approximately $28,000) to eligible projects,[133] covering expenses related to equipment procurement, prototyping, external collaborations, and expert consultations.[134] Similarly, Shandong Province's government implemented a program that promotes environmental-friendly development, providing up to one million yuan (approximately $140,000) to universities and research institutes that aim to commercialize patents in key strategic areas.[135] By converting patents into passports for accessing public funds, these measures transform what might otherwise be merely exclusionary rights into gateways to financial and developmental support. This reorientation augments the economic value of patents, and encourages firms to move toward effective technology deployment.

These policy innovations especially benefit small and medium-sized enterprises (SMEs), which often struggle to obtain capital from traditional financial institutions.[136] By linking patents to various forms of fiscal assistance, local

[131] *See, e.g.*, Guangdongsheng Zhuanli Tiaoli (广东省专利条例) [Guangdong Province Patent Regulations] (promulgated by the Standing Comm. Guangdong Province People's Cong., Sep. 29, 2010, effective Dec. 1, 2010) (China) [hereinafter Guangdong Patent Law], arts. 16.

[132] Jiangsu Patent Law, *supra* note 120, at art. 12; Jiangsusheng Zhishi Chanquan Chuangzao yu Yunyong (Qiye Zhuanli Shishi Jihua) Zhuanxiang Zijin Shiyong Guanli Banfa (江苏省知识产权创造与运用（企业专利实施计划）专项资金使用管理办法) [Measures for the Administration of Special Funds for Intellectual Property Creation and Utilization (Enterprise Patent Implementation Plan) in Jiangsu Province] (promulgated by Jiangsu Province Dep't of Fin., June 24, 2011, Su Cai Gui [2011] No. 21) (China) [hereinafter Jiangsu IP Fund Regulation], arts., 1 & 2.

[133] Jiangsu IP Fund Regulation, *supra* note 132, at art. 12.

[134] *Id.* at art. 11.

[135] Shandongsheng Renmin Zhengfu Guanyu Yinfa 2024 Nian "Cujin Jingji Gonggu Xianghao, Jiakuai Lvse Ditan Gao Zhiliang Fazhan" Zhengce Qingdan (Diyipi) de Tongzhi (山东省人民政府关于印发2024年"促进经济巩固向好、加快绿色低碳高质量发展"政策清单(第一批)的通知) [Notice of the People's Government of Shandong Province on Issuing the 2024 "Promotion of Economic Consolidation and Improvement, Accelerating Green and Low-Carbon High-Quality Development" Policy List (First Batch)] (promulgated by the People's Gov. of Shandong Province, Dec. 28, 2023, effective Jan. 1, 2024), art. 18 (China).

[136] Nikolic, *supra* note 41, at 399; Liu Xiaochen (刘啸尘), *Xin Zhengce Huanjing Xia Zhuanliquan Zhiya Rongzi Zhuanli Jiazhi Pinggu Tixi Youhua Yanjiu* (新政策环境下专利权质押融资专利价值评估体系优化研究) [Optimization of Patent Valuation Systems for Patent Pledge Financing under the New Policy Environment], 19 Jingji Yanjiu Daokan (经济研究导刊) [Econ. Res. Guide] 141, 141 (2023). One of the

governments help firms to surmount early-stage funding gaps, making it easier for them to invest in further R&D, refine prototypes, and navigate the path from lab to market.[137] This shift can have pronounced effects on the overall innovation ecosystem, fueling a continuous cycle of technological advancement and commercialization.[138]

China has also pioneered the use of patent-based financing mechanisms that more directly integrate intellectual property into investment and lending practices.[139] Government-led intellectual property funds draw on both public coffers and private capital,[140] creating mixed-investment vehicles that support promising patent-intensive ventures.[141] At the same time, policies encourage the development of patent pledge financing, wherein patents serve as collateral

reasons that cause the difficulty for SMEs to get loans is that commercial banks generally adhere to stringent risk control standards to safeguard their lending activities. *See* Amir Sufi, *Bank Lines of Credit in Corporate Finance: An Empirical Analysis*, 22 Rev. Fin. Stud. 1057, 1057 (2009); Gabriel Jiménez, Jose A. Lopez & Jesús Saurina, *Empirical Analysis of Corporate Credit Lines*, 22 Rev. Fin. Stud. 5069, 5069 (2009).

[137] *See* Zhang Yaxin (张亚新), *Cujin Zhuanli Chengguo Zhuanhua yu Yun Yong de Zhengce Yanjiu* (促进专利成果转化与运用的政策研究) [Research on Policies to Promote the Transformation and Utilization of Patent Achievements], 24(6) Anhui Jianzhu Daxue Xuebao (安徽建筑大学学报) [Journal of Anhui Jianzhu University] 91, 93 (2016) (noting that insufficient funding is a key barrier to patent implementation, indicating the importance of filling the funding gap).

[138] *See* Chen Jun & Zhang Yunjun, *supra* note 121, at 89–90 (suggesting that patent implementation subsidy policies provide financial support to alleviate cost pressures, particularly for underfunded small and medium-sized technology firms, incentivizing patent commercialization or transactions and enhancing economic efficiency).

[139] 2021 Outline, *supra* note 12 (promoting intellectual property financing by improving pledge information platforms and encouraging various forms of mixed IP pledges and insurance). The "14th Five-Year" IP Protection and Utilization Plan, *supra* note 11 (highlighting the enhancement of intellectual property pledge financing system and improvement of risk management mechanisms to further integrate intellectual property into investment and lending practices).

[140] For example, Hunan Province's government-led IP fund combines public resources and private capital to support high-tech enterprises with valuable IP, offering financial services like equity investments and IP pledge financing. *See* Li Yangfang, *Intellectual Property Operation Fund Injects New Vitality into Patent Financing*, China Nat'l Intell. Prop. Admin. (Sep. 30, 2020), https://www.cnipa.gov.cn/art/2020/9/30/art_408_154393.html [https://perma.cc/3RFU-STDU].

[141] Zhang Xiaoyan, *Henan Establishes Key Industry Intellectual Property Operation Fund*, China Nat'l Intell. Prop. Admin. (Sep. 20, 2017), https://www.cnipa.gov.cn/art/2017/9/20/art_501_41217.html [https://perma.cc/A2CL-VJX2] (highlighting that Henan Province established a 3 billion yuan government-led intellectual property operation fund to attract private capital and support patent-intensive enterprises in key industries); Zhang, *supra* note 137, at 94 (suggesting that to address funding shortages, the government should complement direct research funding with favorable policies and market mechanisms to attract private capital and expand investment channels, alleviating financial bottlenecks in patent commercialization).

for loans.[142] To mitigate the risks that lenders take, local authorities offer risk compensation and interest subsidies to incentivize financial institutions to accept patents as collateral. For example, Hunan's government established a 65-million-yuan (approximately $8.9 million) risk compensation fund, compensating banks for up to 45% of the losses that they incur from patent-backed loans.[143] Studies indicate that patent pledge financing and related policies enable firms to acquire equipment for innovation[144] and bolster enterprise-level R&D investments,[145] fostering a vibrant innovation environment.[146]

In sum, China's patent-and-funding nexus marks a strategic redefinition of the traditional boundaries between intellectual property rights and government support. By treating patents as conduits to both public and private resources, policymakers lower barriers for inventors and entrepreneurs, accelerating the transition from laboratory breakthroughs to commercially viable products.[147]

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[142] *See, e.g.*, Zhishi Chanquan Zhiya Rongzi Ruyuan Huiqi Xingdong Fang'an (2021–2023 Nian) (知识产权质押融资入园惠企行动方案(2021—2023年)) [Action Plan for IP Pledge Financing in Industrial Parks to Benefit Enterprises (2021–2023)] (promulgated by the China Nat'l Intell. Prop. Admin., China Banking & Ins. Regul. Comm'n & Nat'l Dev. & Reform Comm'n, June 16, 2021) (China) (encouraging financial institutions to expand the scope of collateral by bundling various intellectual property rights, such as patents, while exploring the feasibility of pledging IP licensing revenue rights).

[143] *Hunan Province Explores Establishing a Market-Based Intellectual Property Pledge Financing Risk Compensation Mechanism*, Hunan Provincial Mkt. Supervision Admin., (Feb. 1, 2023), https://amr.hunan.gov.cn/amr/xxx/xtdtx/202302/t20230201_29237073.html [https://perma.cc/2E62-5QBY].

[144] Gerald B. Halt et al., Intellectual Property and Financing Strategies for Technology Startups 51 (2017) (noting that IP-based venture debt financing is an innovative financial solution provided to venture-backed companies, used for working capital or acquiring equipment).

[145] Meng Xiangxu (孟祥旭) & Yu Changlin (余长林), *Zhishi Chanquan Baohu Lidudu, Zhuanli Zhiya Rongzi yu Qiye Chuangxin—Jiyu Zhuanli Zhiya Rongzi Shidian de Zhun Ziran Shiyan* (知识产权保护力度,专利质押融资与企业创新—基于专利质押融资试点的准自然实验) [The Strength of Intellectual Property Protection, Patent Pledge Financing, and Enterprise Innovation: A Quasi-Natural Experiment Based on the Pilot Projects of Patent Pledge Financing], 2021(1) Zhidu Jingjixue Yanjiu (制度经济学研究) [Institutional Economics Research] 1, 48 (2021).

[146] Liu Chong (刘冲), Geng Weidong (耿伟栋) & Hong Xinxin (洪欣欣), *Zhuanli Zhiya Dui Qiye Chuangxin de Yingxiang Yanjiu* (专利质押对企业创新的影响研究) [A Study on the Influence of Patent Pledge on Enterprise Innovation], 56(5) Beijing Daxue Xuebao (Zhexue Shehui Kexue Ban) (北京大学学报（哲学社会科学版）) [Journal of Peking University (Philosophy and Social Sciences Edition)] 101, 101 (2019).

[147] *Id.*; *Interpretation of the Notice from the General Office of the Ministry of Finance and the General Office of the China National Intellectual Property Administration on Implementing the Special Patent Commercialization Plan to Support Innovation and Development of SMEs*, Gov.cn (Sep. 22, 2021), https://www.gov.cn/zhengce/2021-03/27/content_5596167.htm [https://perma.cc/9ZLM-DGGZ].

This synergy exemplifies the core logic of China's coordinated patent regime, which deliberately mobilizes public resources to create tangible technological development.

### *B. Patent and Procurement Preferences*

China's coordinated patent regime ties patents to government procurement policies in a clear and documented manner, leveraging public-sector purchasing power to support patented technologies. Numerous local laws and regulations require procurement authorities to give priority to products incorporating patented inventions.[148] For example, Article 19 of Xinjiang region's local patent law states that when quality and price are comparable, "government procurement should prioritize the purchase of patented products and related services."[149] By giving patented goods preferential access under comparable quality and price conditions, these policies cultivate a critical mass of public demand, reduce market risks for patent holders, and foster the economies of scale and learning needed to advance early-stage innovation.[150]

In addition, several local governments have established so-called "first-purchase" measures to promote newly developed patented products.[151] For instance, Article 15 of Shenyang's local patent law calls on government procurement agencies to be the first to purchase emerging domestic technologies,

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[148] *See, e.g.*, Guangdong Patent Law, *supra* note 131, at art. 12; Zhengzhoushi Zhuanli Cujin he Baohu Tiaoli (郑州市专利促进和保护条例) [Regulations on the Promotion and Protection of Patents in Zhengzhou City] (promulgated by the Standing Comm. Zhengzhou City People's Cong., approved by the Standing Comm. Henan Province People's Cong., July 31, 2009, promulgated Sep. 1, 2009, effective Oct. 1, 2009), art. 10 (China) [hereinafter Zhengzhou Patent Law].

[149] Xinjiang Weiwuer Zizhiqu Zhuanli Cujin Yu Baohu Tiaoli (新疆维吾尔自治区专利促进与保护条例) [Regulations on the Promotion and Protection of Patents in the Xinjiang Uygur Autonomous Region] (promulgated by the Standing Comm. Xinjiang Uygur Autonomous Region People's Cong. Sep. 28, 2012, effective Dec. 1, 2012), art. 19 (China) [hereinafter Xinjiang Patent Law].

[150] Jakob Edler & Luke Georghiou, *Public Procurement and Innovation—Resurrecting the Demand Side*, 36 Res. Pol'y 949, 956 (2007) ("Such public demand creates clear incentives for manufacturers, reduces their market risk, and enables early economies of scale and learning.").

[151] *See, e.g.*, Shenyangshi Zhuanli Cujin Tiaoli (沈阳市专利促进条例) [Regulations on Promotion of Patents in Shenyang City] (promulgated by the Standing Comm. Shenyang City People's Cong., Jan. 8, 2010, effective Mar. 1, 2010), art. 15 (China) [hereinafter Shenyang Patent Law]; Tianjinshi Zhuanli Cujin yu Baohu Tiaoli (天津市专利促进与保护条例) [Regulations on the Promotion and Protection of Patents in Tianjin City] (promulgated by the Standing Comm. Tianjin City People's Cong., Mar. 30, 2016, effective Mar. 30, 2016) (China) [hereinafter Tianjin Patent Law], art. 23.

thereby helping firms secure initial buyers for novel inventions.[152] Such initiatives address a core limitation of traditional patent systems: while patents confer a right to exclude (and can signal technological merit), they do not create early customers or guaranteed demand, so private buyers often hesitate to adopt unproven technologies. By ensuring a baseline level of demand through public-sector orders, these local regulations not only encourage patent-intensive enterprises to invest in research and commercialization, but also help build essential production capacities, which can accelerate the development and adoption of emerging technologies.[153]

Moreover, local authorities place heightened emphasis on products that embody "indigenous intellectual property." By favoring domestically developed patented technologies, the Chinese government seeks to fortify national innovation strategies aimed at augmenting domestic technological capabilities and reducing reliance on foreign creations.[154] For example, Taiyuan's local patent regulations explicitly require that, when government agencies seek to procure high-tech equipment and products, they give priority to the domestic firms holding independent IP rights.[155] In the context of intensifying geopolitical and technological competition, these policies assume strategic significance: They ensure that local firms, especially those pursuing cutting-edge advancements, benefit from stable initial demand from the public sector. In doing so, the measures not only bolster indigenous high-tech industries but also advance broader national objectives, such as achieving technological self-sufficiency and reinforcing long-term innovation capacity.[156]

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[152] Shenyang Patent Law, *supra* note 152, at art. 15.

[153] Edler & Georghiou, *supra* note 150, at 956 (noting that state demand for innovations drives both technological and production capacities, with early strong demand accelerating development and adoption, especially technology in early phase).

[154] State Council of the P.R.C., The National Medium- and Long-Term Program for Science and Technology Development (2006–2020): An Outline (2006) (English trans.), at 10 ("Facts have proved that, in areas critical to the national economy and security, core technologies cannot be purchased. If our country wants to take the initiative in the fierce international competition, it has to enhance its indigenous innovation capability, master core technologies … [and] own proprietary intellectual property rights.").

[155] Taiyuanshi Cujin Zhuanli Zhuanhua Banfa (太原市促进专利转化办法) [Measures on the Promotion of Patent Commercialization in Taiyuan City] (promulgated by the Standing Comm. Taiyuan City People's Cong., approved by the Standing Comm. Shanxi Province People's Cong., Sep. 26 & 28, 2007, effective Nov. 1, 2007), art. 10 (China); *see also* Guangdong Patent Law, *supra* note 131, at art. 12.

[156] Yanchao Li & Luke Georghiou, *Signaling and Accrediting New Technology: Use of Procurement for Innovation in China*, 43 Sci. & Pub. Pol'y 338, 338 (2016) ("In China the use of public procurement as an innovation policy instrument has been closely associated with the drive to promote indigenous innovation").

Some localities combine procurement preferences with government funding mechanisms to create cumulative incentives that support development from the R&D phase through market entry. For example, Article 12 of Baotou's local patent law stipulates that once patented products developed with the assistance of government funding meet the technical criteria of procurement agencies, they should receive priority in government purchasing.[157] This layered approach not only helps innovators overcome early financial obstacles, but also lowers barriers to entry in public markets after R&D is complete. By reducing both the financial and the market-access hurdles that emerging technologies face, such cumulative incentives ameliorate a key limitation of traditional patent systems, namely, the lack of connection between the grant of an exclusive right and the practical challenges of commercializing novel products.[158]

By offering a dependable early customer base, government procurement can encourage innovators to undertake higher-risk R&D projects that might otherwise struggle to gain traction. For fledgling or resource-limited enterprises, a government contract serves as a credential that can reduce information asymmetries and bolster credibility with prospective investors and commercial partners. Although procurement preferences do not guarantee lasting market success, they can generate a positive signaling effect:[159] An early purchase order from a recognized public buyer can enhance consumer and investor confidence, facilitating subsequent market penetration and growth.[160] Research indicates that government procurement policies can enhance a company's ability to attract private

[157] Baotoushi Zhuanli Cujin yu Baohu Tiaoli (包头市专利促进与保护条例) [Regulations on the Promotion and Protection of Patents in Baotou City] (promulgated by the Standing Comm. Baotou City People's Cong., approved by the Standing Comm. Inner Mongolia Autonomous Region People's Cong., May 22, 2009, effective Aug. 1, 2009), art. 12 (China) [hereinafter Baotou Patent Law].

[158] Sichelman, *supra* note 70, at 343.

[159] *See* Robin Kleer, *Government R&D Subsidies as a Signal for Private Investors*, 39 Res. Pol'y 1361, 1367 (2010); Yue Guo, *Zhengfu Chuangxin Buzu De Xinhao Chuandi Jizhi Yu Qiye Chuangxin* (政府创新补助的信号传递机制与企业创新) [Signaling Mechanisms of Government Innovation Subsidies and Firm Innovation], 9 Zhongguo Gongye Jingji (中国工业经济) [China Industrial Economy] 98, 113 (2018) (noting that finding government subsidies for innovation creates a positive signaling effect, enhancing firms' ability to attract additional resources).

[160] *Id.*

investment, an especially important benefit for SMEs, which often find it difficult to persuade investors of their long-term growth potential.[161]

### *C. Patent and Regulatory Benefits*

One of the most distinctive aspects of this regime is the systematic integration of patents into regulatory frameworks that extend well beyond conventional intellectual property protections. Under this model, patents serve not merely as tools of market competition or legal shields for inventions, but also as conduits for accessing a wide array of regulatory benefits. Through crafted policies, the patent system influences career trajectories and enterprise qualifications, transforming patents into multifaceted instruments of innovation governance.[162]

At the individual level, the intersection between patents and professional advancement illustrates how patents have taken on greater significance in China's innovation ecosystem.[163] The professional title system, a state-administered framework, plays a pivotal role in recognizing qualifications and achievements across specialized fields such as engineering, the natural sciences, and the medical sciences.[164] Higher-level titles confer distinct advantages, including better employment prospects, enhanced opportunities for promotion, and increased

[161] Sabrina T. Howell, *Financing Innovation: Evidence from R&D Grants*, 107 Am. Econ. Rev. 1136, 1136–38 (2017); Miguel Meuleman & Wouter De Maeseneire, *Do R&D Subsidies Affect SMEs' Access to External Financing?*, 41 Res. Pol'y 580, 580–81 (2012).

[162] *See, e.g.*, Guanyu Jinyibu Jiaqiang Zhishi Chanquan Gongzuo de Ruogan Yijian (关于进一步加强知识产权工作的若干意见) [Several Opinions on Further Strengthening Intellectual Property Work] (promulgated by the People's Gov't of Hubei Province, Mar. 16, 2006, effective Mar. 16, 2006), art. 8 (China) (emphasizing the guiding role of intellectual property by prioritizing support for enterprises and products with independent IP in policy-making, and using the quantity and implementation benefits of patents, particularly invention patents, as key criteria for funding, rewards, and high-tech enterprise recognition, while integrating IP performance into researchers' and educators' evaluations).

[163] *See, e.g.*, Luoyang Patent Law, *supra* note 120, at art. 13; Yunnansheng Zhuanli Cujin Yu Baohu Tiaoli (云南省专利促进与保护条例) [Regulations on the Promotion and Protection of Patents in Yunnan Province] (promulgated by the Standing Comm. Yunnan Province People's Cong. Nov. 29, 2012, effective Mar. 1, 2013), art. 23 (China).

[164] Sun Yiping (孙一平) & Cai Xuejun (蔡学军), *Zhicheng Zhidu Jiben Gainian Jieding yu Zhengce Quxiang de Bianxi* (职称制度基本概念界定与政策取向的辨析) [Analysis of the Basic Concept Definitions and Policy Orientation of the Professional Title System], 45(8) Zhongguo Renshi Kexue (中国人事科学) [China Human Resource Science] 63, 63–66 (2018).

earning potential.[165] Many enterprises and public institutions tie professional titles directly to salary, with senior titles ensuring significantly higher compensation.[166] Moreover, professional titles symbolize official recognition of an individual's expertise, elevating their social standing and reputation.[167]

These state-issued designations traditionally depended on factors such as educational credentials, years of work experience, technical expertise, and ethical conduct.[168] In recent years, however, the central government has shifted its focus toward concrete achievements, including practical outputs and innovative contributions.[169] Because professional titles function as the state's core system for evaluating and managing technical personnel, they directly affect career advancement, remuneration, and institutional standing—which makes the growing emphasis on patents in title evaluations especially consequential.[170] Within this evolving framework, patents have become a critical benchmark of contributions and outputs.[171] Many provinces and municipalities now require human resource evaluation bodies to consider patents in professional title assessments.[172] For example, Jiangsu Province's local patent law explicitly states that "relevant units should consider the patent inventions and designs of inventors and designers as one of the bases for professional title evaluation."[173]

In some cases, jurisdictions have introduced "fast-track" mechanisms that allow candidates who possess a significant number of high impact, granted

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[165] Yue Jiamei (越佳美), *China's Professional Title Series, Levels, and Benefits* (中国职称系列及级别和好处), 163 (Oct. 9, 2022), https://www.163.com/dy/article/HJ8433400551PTZJ.html [https://perma.cc/CE3U-4N4U].

[166] *The Impact of Professional Titles on Occupational Status* (职称对职业地位的影响), Sohu (Dec. 19, 2023), https://www.sohu.com/a/745348924_120942245 [https://perma.cc/DM5E-GSF9].

[167] *Id.*

[168] Zhicheng Pingshen Guanli Zanxing Guiding (职称评审管理暂行规定) [Interim Provisions on the Management of Professional Title Evaluation] (promulgated by the Ministry of Hum. Res. and Soc. Sec., July 1, 2019, effective Sep. 1, 2019), art. 2 (China).

[169] Guanyu Shenhua Zhicheng Zhidu Gaige de Yijian (关于深化职称制度改革的意见) [Opinions on Deepening the Reform of the Professional Title System] (issued by the Gen. Off. of the CPC Cent. Comm. & the Gen. Off. of the State Council, Jan. 8, 2017), § 3 (China).

[170] *See id.* ("The professional title system is the basic system for evaluating and managing professional technical personnel … it is of great significance for motivating their career development.").

[171] *Id.*

[172] *See, e.g.*, Jiangsu Patent Law, *supra* note 120, at art. 19; Luoyang Patent Law, *supra* note 120, at art. 13; Tianjin Patent Law, *supra* note 151, at art. 47; Baotou Patent Law, *supra* note 157, at art. 11.

[173] Jiangsu Patent Law, *supra* note 120, at art. 19.

patents to bypass standard requirements, such as advanced degrees or lengthy work experience, and secure senior professional titles more swiftly.[174] Guangdong Province, for instance, permits engineers who lack certain formal qualifications to seek promotion to senior engineers if they have obtained at least one invention patent that yields substantial economic and social benefits.[175] Similarly, Shandong Province has developed a "fast track" for professional title promotion, using authorized invention patents as a key criterion.[176] This practice has enabled 245 individuals to obtain provincial-level professional titles in the field of new functional materials engineering, including 12 senior titles and 97 intermediate titles.[177]

The implementation of these policies has, in several instances, substantially increased the importance of patents for an individual's career development, giving researchers and technologists an incentive to focus on patentable outcomes. However, this can have mixed consequences. On the one hand, it might encourage scientists, engineers, and other technical professionals to engage more actively in innovative research, and to seek patent protection for their work, thus fostering a more innovation-oriented culture within the institutions that employ them. On the other hand, the emphasis on patent counts might inadvertently prioritize quantity over quality,[178] nudging professionals to pursue easily patentable but less groundbreaking inventions.

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[174] *See, e.g.*, Jiangsu Patent Law, *supra* note 120, at art. 19 ("Relevant entities shall take patents into account in professional title evaluations … patents that play a major role in technological progress or yield significant economic benefits may serve as a basis for exceptional applications; principal inventors receiving the China Patent Award may apply exceptionally.")

[175] Guangdongsheng Gongye Sheji Gongcheng Jishu Rencai Zhicheng Pingjia Biaozhun Tiaojian (广东省工业设计工程技术人才职称评价标准条件) [Standards and Conditions on the Professional Title Evaluation of Industrial Design Engineering and Technical Talent in Guangdong Province] (promulgated by the Guangdong Provincial Dep't of Hum. Res. & Soc. Sec. and Guangdong Provincial Dep't of Indus. & Info. Tech., June 22, 2021), Ch. 3 § 4.1.3.4 (China).

[176] Shandong Sheng Dongying Jingji Jishu Kaifaqu (山东省东营经济技术开发区), *Shandong Dongying Jingkaiqu: Tansuo "Zhishi Chanquan + Rencai" Xietong Peiyu Xin Lu Jing* (山东东营经开区:探索"知识产权+人才"协同培育新路径) [Shandong Dongying Economic Development Zone: Exploring a New Path for the Coordinated Cultivation of "Intellectual Property + Talent"], 2023(1) Zhongguo Rencai (中国人才) [China Talents] 76, 77 (2023).

[177] *Id.*

[178] IPKey, Study on Bad Faith Patent Application in China 32 (2022) (noting that the Chinese government's use of patent application KPIs encouraged low-quality patent applications aimed at securing subsidies).

Similar principles apply at the organizational level. Many localities rely on patent-related metrics to determine whether firms qualify as "High-Tech Enterprises,"[179] "Specialized, Refined, Distinctive, and Innovative 'Little Giant' Enterprises,"[180] or other categories that confer privileged business status.[181] For example, Article 8 of Qingdao's local patent law explicitly includes both the quantity and quality of patents as criteria for certifying high-tech enterprises and enterprise technology centers.[182] These certifications often unlock tangible advantages such as tax incentives, preferential credit access, and priority consideration in government support programs.[183] In Shantou, Article 24 of the local patent law designates the possession of self-developed patented technologies as a key condition for recognition as a "leading industrial enterprise."[184] This status confers a range of regulatory and financial benefits, from priority in exhibition

[179] *See, e.g.*, Henansheng Zhuanli Baohu Tiaoli (河南省专利保护条例) [Regulations on the Protection of Patents in Henan Province] (promulgated by the Standing Comm. Henan Province People's Cong., Dec. 2, 2005, effective Mar. 1, 2006), art. 17, 2005 Henan Shen Ren Da (China).

[180] *See, e.g.*, Gongye he Xinxi Hua Bu Bangongting Guanyu Kaizhan Disiliu Pi Zhuanjingtexin "Xiao Juren" Qiye Peiyu He Disan Pi Zhuanjingtexin "Xiao Juren" Qiye Fuhe Gongzuo de Tongzhi (工业和信息化部办公厅关于开展第六批专精特新"小巨人"企业培育和第三批专精特新"小巨人"企业复核工作的通知) [Notice on Carrying Out the Cultivation of the Sixth Batch of Specialized, Refined, Distinctive, and Innovative "Little Giant" Enterprises and the Reexamination of the Third Batch of Specialized, Refined, Distinctive, and Innovative "Little Giant" Enterprises] (promulgated by the Gen. Off. of the Min. of Indus. & Info. Tech., Apr. 17, 2024) 2024 Gongxinting Qiye Han No. 142 (China).

[181] *See, e.g.*, Shantoushi Zhuanli Baohu Yu Cujin Tiaoli (汕头市专利保护与促进条例) [Regulations on the Promotion of Patents in Shantou City] (promulgated by the Standing Comm. Shantou City People's Cong. Oct. 9, 2021, effective Nov. 1., 2021), art. 24 (China) [hereinafter Shantou Patent Law] ("leading industrial enterprise").

[182] Qingdaoshi Zhuanli Baohu Guiding (青岛市专利保护规定) [Regulations on Patent Protection in Qingdao City] (promulgated by the Standing Comm. Qingdao City People's Cong., Nov. 15, 2011, effective Nov. 15, 2011), art. 8 (China) [hereinafter Qingdao Patent Law].

[183] Sun Yong (孙勇), Ma Yuanting (马园庭) & Zhang Yafeng (张亚峰), 政府专利资助与企业专利申请的演化博弈分析[Evolutionary Game Analysis of Government Patent Subsidies and Enterprise Patent Applications], 41(5) Qingbao Zazhi (情报杂志) [Journal of Information] 198, 200 (2022) (China).; *see, e.g.*, Guangzhoushi Zhuangda Keji Chuangxin Zhuti Cujin Gaoxin Jishu Qiye Gaozhiliang Fazhan Ruogan Cuoshi (广州市壮大科技创新主体促进高新技术企业高质量发展若干措施) [Several Measures of Guangzhou Municipality on Strengthening Technological Innovation Entities and Promoting the High-Quality Development of High-Tech Enterprises] (promulgated by the Off. Guangzhou Mun. People's Gov't, Suifu Ban, Aug. 14, 2023) Guangzhou Mun. People's Gov't No. 16 (China). (providing eligible high-tech enterprises with guidance services in areas such as project development, taxation, workforce, electricity usage, residence registration, and schooling for employees' children, among other related services; enhancing financial support at the municipal and district levels; and coordinating efforts to support high-tech enterprises in the allocation of innovation resources and major projects).

[184] Shantou Patent Law, *supra* note 181, at art. 24.

booths and streamlined customs clearance to easier participation in governmental projects. It also facilitates more favorable financing terms.[185]

By tying government incentives to patent holdings, China's innovation governance system effectively recasts patents as "innovation credentials" for firms — intangible assets that signal technological capacity and invite supportive policy measures.[186] In this environment, owning patents can help businesses mitigate uncertainties and gain access to strategic resources. Consequently, companies might strategically accumulate patent portfolios (i.e., bundles of related patents) not merely to secure market advantages, but also to bolster their reputational standing and benefit from institutional backing within China's regulatory framework.[187]

This interplay between patents and government regulatory frameworks also extends to entities beyond private enterprises. Beijing tasked municipal patent authorities — together with the departments responsible for science, development planning, economic and information affairs, education, and agriculture and rural affairs — with establishing a patent-focused performance indicator system for various innovation actors, including enterprises, universities, research institutes, and social organizations.[188] The results of these evaluations serve as a basis for

[185] Shantou Shi Renmin Zhengfu Yingfa Shantou Shi Gongye Shangmao Longtou Qiye Rending Banfa He Fuchi Cuoshi De Tongzhi (汕头市人民政府印发汕头市工业商贸业龙头企业认定办法和扶持措施的通知) [Notice on the Recognition and Support Measures of the Leading Enterprises in Industry and Trade of Shantou City by the People's Gov. of Shantou City] (promulgated by the Shantou City People's Gov. Sep. 1, 2004, effective Sep. 1, 2004), https://www.lawlawing.com/community/137987 [https://perma.cc/6U9M-22QX].

[186] Qingdao Patent Law, *supra* note 182, at art. 8 ("Patent quantity and quality, and the soundness of patent management systems, shall be taken as important criteria for recognizing high-tech enterprises and enterprise technology centers."); Ministry of Sci. & Tech., Ministry of Fin., and State Tax'n Admin., Measures for the Administration of Recognition of High- and New-Technology Enterprises (Guo Ke Fa Huo [2016] No. 32) art. 4 (2016) (China) ("Enterprises form core proprietary intellectual property … enterprises recognized under these Measures may enjoy tax preferences.").

[187] Yang Guochao (杨国超) & Rui Meng (芮萌), *Gaoxin Jishu Qiye Shuishou Jianmian Zhengce de Jili Xiaoying yu Yinghe Xiaoying* (高新技术企业税收减免政策的激励效应与迎合效应) [The Incentive and Catering Effects of Tax Reduction Policies for High-Tech Enterprises], 2020(9) Jingji Yanjiu (经济研究)[Economic Research] 174, 175 (2020).

[188] Beijingshi Zhuanli Baohu He Cujin Tiaoli (北京市专利保护和促进条例) [Regulations on Patent Protection and Promotion in Beijing City] (promulgated by the Standing Comm. of the Beijing Municipal People's Congress, Mar. 12, 2021, effective Mar. 12, 2021), art. 33 (China).

official support or recognition.[189] Likewise, Jilin Province's patent law obligates county-level and higher government departments to incorporate key patent metrics into the evaluation of technology plans, state-owned enterprise performance, and the research accomplishments of government-run R&D institutions and universities.[190] By embedding patent-related benchmarks within these review processes, policymakers can foster innovation in organizations that might not succeed using purely market-based incentives, thereby expanding the reach and influence of the patent system.

In essence, China's patent-regulatory nexus enlarges the domain of its patent system from a market-based mechanism for protecting inventions to a powerful lever for shaping career paths, firm strategies, and institutional behavior. By rendering patent ownership an important criterion for professional recognition, preferential treatment, and resource allocation, the state is reshaping the innovation landscape so that patents function as keys that unlock a wide range of public benefits. While this strategy holds promise in galvanizing R&D efforts, it also raises important questions about how best to ensure that patent-based metrics accurately reflect meaningful innovation and do not inadvertently encourage superficial IP accumulation.

### *D. Patent and Tax Incentives*

China's coordinated patent regime extends beyond direct funding, procurement preferences, and regulatory benefits, integrating patents deeply into its fiscal policy framework. While European "patent box" regimes typically offer a single, preferential tax rate on income derived from qualifying patents, such as Ireland's 6.25% rate on patent income, the United Kingdom's 10% rate, Hungary's 4.5% rate, or Cyprus' 2.5% rate,[191] China has adopted a more comprehensive system of patent-related tax incentives. Rather than conferring a single, preferential rate on patent-generated revenue, China's policies address the entire innovation lifecycle, offering targeted relief at multiple stages.

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[189] *Id.*

[190] Jilinsheng Zhuanli Tiaoli (吉林省专利条例) [Regulations on Patents in Jilin Province] (promulgated by the Standing Comm. Jilin Province People's Cong., Dec. 1, 2017, effective Jan. 1, 2018), art. 6 (China).

[191] Alex Mengden, *Patent Box Regimes in Europe, 2023*, Taxfoundation.org (Aug. 8, 2023), https://taxfoundation.org/data/all/eu/patent-box-regimes-europe-2023/ [https://perma.cc/XNR8-KNM9]. Patent boxes are becoming increasingly popular in Europe, and remain a subject of debate in the United States. *See* Graetz & Doud, *supra* note 87, at 362–75.

At the R&D stage, the patent law of numerous localities allows for tax deductions and credits that account for both the uncertainties of innovation and its varying outcomes.[192] For example, Article 16 of Jiangsu Province's local patent law allows companies engaging in new technology, product, or process development to deduct 50% of their eligible R&D expenses from their taxable income if those expenses do not lead to the creation of intangible assets.[193] If they do create intangible assets, firms may amortize them at 150% of cost. By adjusting the tax base in this manner, the policy not only compensates for failed R&D efforts, to some extent, but also enhances long-term incentives for successful innovations.[194] In contrast to the uniform patent box rates at the commercialization stage commonly seen in the EU,[195] this tailored approach might better align tax benefits with the inherent complexity and variability of R&D activities.

The tax advantages extend to the transfer and licensing of patented technologies.[196] Take, for example, the local patent law of Xinjiang region, which stipulates that eligible income from patent assignments or licensing agreements can receive specified tax reductions.[197] These measures facilitate a more active patent market by encouraging patent holders to sell or license unexploited technologies rather than leaving them dormant. The economic logic is straightforward: reducing the fiscal burdens related to IP transactions increases market liquidity, fosters knowledge diffusion, and enhances the chances that valuable but underutilized inventions will find commercial application. To prevent abuse of these incentives, certain local regulations, such as Article 14 of the local patent law of Zibo city, condition tax benefits on formal recognition of the underlying technology contracts, ensuring the integrity of these preferential treatments.[198]

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[192] *See* Michael Kahn, Luiz Martins De Melo & Marcelo G. Pessoa de Matos, *The Financing of Innovation*, *in* Financing Innovation 1, 2 (2020) (noting that inherent high risk and uncertainty characterize innovation).

[193] Jiangsu Patent Law, *supra* note 120, at art. 16.

[194] *Id.*

[195] *See* Mengden, *supra* note 191.

[196] *See, e.g.*, Jiangsu Patent Law, *supra* note 120, at art. 18; Shantou Patent Law, *supra* note 181, at art. 23.

[197] Xinjiang Patent Law, *supra* note 149, at art. 17.

[198] Ziboshi Zhuanli Guanli Tiaoli (淄博市专利管理条例) [Regulations on Patent Administration in Zibo City] (promulgated by the Standing Comm. Zibo City People's Cong., approved by the Standing Comm. Shandong Province People's Cong., July 28, 2006, effective Sep. 1, 2006), art. 14 (China); *see also* Shantou Patent Law, *supra* note 181, at art. 23

China's patent-related tax incentives also extend into the often-overlooked realm of intermediary services, where specialized brokerage firms and consultancies play a critical role in bridging information gaps and reducing the high transaction costs commonly associated with complex patent transfers.[199] Recognizing that these intermediaries are pivotal to matching patent supply with demand, Article 16 of Jiangsu Province's local patent law specifically grants value-added tax reductions on qualifying IP service income,[200] lowering the rate to 6%,[201] a substantial improvement over the standard 13%.[202] This policy not only eases the fiscal burden on knowledge brokers, but also encourages their active participation in patent marketplaces, where they handle tasks like information matching, technology evaluation, and negotiation coordination. By breaking down transaction barriers,[203] these intermediary agencies enhance the fluidity of patent transactions and help ensure that innovative technologies find right buyers, thereby fostering a more efficient, vibrant patent market.[204]

China's incentives do not cease at the commercialization stage. Legal measures aim to integrate patent-related tax benefits with corporate income tax regimes to smooth the transition from an experimental technology to a fully marketable product. For instance, Article 17 of the Jiangxi Province's local patent law provides tax concessions to enterprises that develop new products from their patented technologies.[205] Article 11 of the Xinjiang region's local patent law allows

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[199] Zhang, *supra* note 137, at 93.

[200] Jiangsu Patent Law, *supra* note 120, at art. 16.

[201] Yu Gang & Ai Hong, *An Analysis of Tax Policies in the Intellectual Property Service and Agency Industry*, Kangxin (July 18, 2016), https://www.kangxin.com/html/1/173/174/359/2416.html [https://perma.cc/6YCD-PSHJ].

[202] Zhonghua Renmin Gongheguo Zengzhi Shui Fa (中华人民共和国增值税法) [Value-Added Tax Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Dec. 25, 2024), art. 10.3 (China).

[203] Zhang Xiangzhi (张祥志) et al., *Guojia Zhuanli Zhuanhua Zhuanxiang Jihua de Difang Shijian yu Qishi—Jiyu 16 Ge Shengfen 139 Fen Zhuanli Zhuanhua Zhengce Wenjian de Fenxi* (国家专利转化专项计划的地方实践与启示—基于16个省份139份专利转化政策文件的分析) [Local Practice and Implications of the National Special Plan for Patent Commercialization: An Analysis of 139 Patent Commercialization Policy Documents in 16 Provinces], 44(2) Keji Guanli Yanjiu (科技管理研究) [Science and Technology Management Research] 133, 136 (2024).

[204] *Id.*; Zhang, *supra* note 137, at 93.

[205] Jiangxisheng Zhuanli Cujin Tiaoli (江西省专利促进条例) [Regulations on the Promotion of Patents in Jiangxi Province] (promulgated by the Standing Comm. Jiangxi Province People's Cong., Nov. 27, 2009, effective Jan. 1, 2010), art. 17 (China).

enterprises and research institutions engaged in the R&D of patented products to claim tax reductions on their expenditures.[206] These measures recognize that transforming a patent into a commercially viable product often involves substantial costs and risks.[207] By reducing the tax burden during these more expensive, high-risk phases of development, they help firms avoid running out of resources before reaching full-scale market readiness, thereby bridging the gap between promising prototypes and commercial application.

Compared to traditional patent box regimes, China's framework for patent-related tax incentives offers three distinguishing features. First, it employs a diverse toolkit — covering income tax relief, value-added tax reductions, and super-deductions for R&D expenses — instead of relying on a single, preferential rate. Second, it adopts a context-sensitive, staged approach by tailoring specific tax benefits to different categories of entity and various phases of the innovation process, rather than focusing solely on the commercialization endpoint. Third, it provides developers with continuous support, from the earliest stages of research through technology transfer and eventual product launch. Taken together, these measures highlight the ways by which China's tax policy weaves patent incentives into a broad strategy for spurring innovation, one that addresses not only market-ready inventions but also the upstream and intermediary phases.

## III
## Evaluation

China's coordinated patent regime stands at the intersection of significant promise and equally significant risk. By tightly integrating patents with state-driven measures — from subsidies and procurement preferences to regulatory privileges — China has assembled a powerful mechanism for tackling market failures and enhancing innovation governance. Yet this very alignment raises fundamental

[206] Xinjiang Patent Law, *supra* note 149, at art. 11; *see also* Tianjin Patent Law, *supra* note 151, at art. 10.

[207] *See* Robert G. Cooper & Elko J. Kleinschmidt, *Success Factors in Product Innovation*, 16 Indus. Mktg. Mgmt. 215, 215 (1987) (contending that "product innovation remains a very high-risk endeavor, fraught with difficulties and littered with failures"); F. M. Scherer & Dietmar Harhoff, *Technology Policy for a World of Skew-distributed Outcomes*, 29 Rsch. Pol'y 559, 565 (2000) (highlighting that most innovation efforts result in little to no economic benefit, while only a small portion creates significant value); *see also* OECD, Enquiries into Intellectual Property's Economic Impact 460 (2015) ("[I]nnovative projects tend to be very risky at their inception. Very few projects result in high returns; most turn out to have little or no value.").

questions about patent quality, resource misallocation, and the compatibility of such far-reaching interventions with global trade and IP obligations. The following analysis probes both the regime's strengths and its structural vulnerabilities.

### *A. Merits*

China's coordinated patent regime offers a systematic approach to the institution of innovation,[208] tightly coupling patent rights with an array of state-backed incentives to generate particular advantages. First, it addresses multiple forms of market failure more comprehensively than traditional, market-oriented patent systems. Conventional patent regimes excel at mitigating the appropriability problem by granting inventors temporary exclusive rights, yet they rarely guide technologies through the perilous gap between initial invention and commercial realization.[209] As Ted Sichelman observes, the conventional patent system is limited in promoting commercialization of invention.[210] The lack of resources leaves many innovations stranded in a so-called "valley of death."[211] In contrast, China's coordinated model deploys layered government supports — from R&D subsidies and tax benefits in the early stages to procurement preferences and specialized financing tools at later phases — designed to lower barriers and mitigate uncertainties throughout the entire innovation lifecycle.

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[208] This reflects the systematic thinking of institutional reform in China. *See* Xi Jinping Economic Thought Research Center, *Focusing on Building a High-Level Socialist Market Economy System*, NDRC.GOV.CN (Sep. 18, 2024), https://www.ndrc.gov.cn/wsdwhfz/202409/t20240918_1393064.html [https://perma.cc/3TBD-YCUM] (emphasizing "greater system integration" by enhancing the "systemic, holistic, and coordinated nature of reforms, driving various reform measures in the same direction to create synergy").

[209] *See* Philip E. Auerswald & Lewis M. Branscomb, *Valleys of Death and Darwinian Seas: Financing the Invention to Innovation Transition in the United States*, 28 J. TECH. TRANSFER 227, 229 (2003) (highlighting that the term "valley of death" indicates the resource shortfall that entrepreneurs face during the transition from invention to innovation, emphasizing the "capital gap" that leaves many early-stage projects without the necessary support to progress).

[210] *See* Sichelman, *supra* note 70, at 365–66 (noting that patent laws primarily incentivize the act of invention, but do not directly address the broader process of innovation, including the commercialization and market adoption of new technologies); *see also* Xu Wen (徐闻), *Zhongguo Zhuanli Chengguo Zhuanhua Wenti ji Celue Yanjiu* (中国专利成果转化问题及策略研究) [Research on Issues and Strategies of China's Patent Commercialization], 2020(4) XIN JINGJI DAOKAN (新经济导刊) [New Economy Guide] 32, 32 (2020) (contending that patents drive economic and social progress only when integrated into production; otherwise, they remain unused and lack practical benefits).

[211] Auerswald & Branscomb, *supra* note 209, at 229.

More concretely, at the R&D stage, these measures reduce upfront costs for innovators, particularly SMEs, alleviating capital constraints and enabling them to engage in early-stage research that might otherwise prove too risky.[212] As projects advance, commercialization-focused policies come into play. For instance, numerous local regulations stipulate that government entities should prioritize the purchase of patented products that have recently entered the market, thereby offering innovators an initial, reliable customer base. Similarly, patent pledge financing and risk-compensation mechanisms — such as Hangzhou's 30-million-yuan (approximately $4.1 million) IP financing risk compensation fund, which covers up to 40% of losses on patent-backed loans[213] — help reduce financial uncertainty in the later stages of development. By coordinating these interventions, the system aims to respond to the complexities and bottlenecks that innovators face.

Second, at least at the level of institutional design, China's coordinated patent regime exemplifies what Susana Borrás and Charles Edquist describe as a "policy mix" — an integrated set of innovation policy instruments tailored to address multidimensional needs.[214] Drawing on the insight that policy instruments should be designed and combined to "address the complex problems of the innovation processes,"[215] China's framework embeds patents within a broader constellation of procurement incentives, financing tools, and tax measures. This structured alignment helps reduce the fragmentation commonly associated with stand-alone policies. By systematically weaving patents into various layers of its innovation policy, China offers an example of how a government can structure an instrument mix in a way that promotes technological development.

Third, China's coordinated patent system can help solve "principal-agent" problems in public-sector innovation.[216] These problems include situations

[212] *See* Takalo & Tanayama, *supra* note 123, at 16 ("First, the subsidy itself reduces the capital costs related to the innovation projects by reducing the amount of market-based capital required").

[213] Zhu Jinjin, *The "Hangzhou Patent Pledge Financing Risk Compensation Fund Management Measures" Introduced: A 30 Million Yuan Compensation Fund to Support Enterprises in Resuming Work and Production*, Hznews (Feb. 22, 2020), https://hznews.hangzhou.com.cn/jingji/content/2020-02/22/content_7680936.htm [https://perma.cc/D44P-684U].

[214] Borrás & Edquist, *supra* note 17, at 1519–20.

[215] *Id.* at 1513.

[216] *See* Luc E. Leruth & Elisabeth Paul, *A Principal-Agent Theory Approach to Public Expenditure Management Systems in Developing Countries*, 2006 IMF Working Papers 1, 4–5 (2006) (discussing how asymmetric information and conflicting objectives between principals and agents can lead to governance

in which the government (the "principal") has different motivations or less information than the people or institutions ("agents") doing the research and development.[217] Because new technologies often involve technical uncertainty, it's hard for the government to tell whether poor results stem from external factors (a "low exogenous state of nature") or from agents' misaligned incentives, insufficient effort, or misuse of resources.[218] China's coordinated regime employs patent-related metrics as a way to gauge performance. For instance, Gansu's local patent law incorporates inventors' patent holdings into both state-owned enterprise performance evaluations and the assessment of research productivity at universities and research institutes,[219] while Liaoning's local patent law views patent quality and quantity as key indicators for accrediting engineering research centers and key laboratories.[220] By establishing such concrete standards, policymakers can reduce information gaps and enhance accountability in publicly funded entities.[221]

The same principle also applies to the distribution of government grants and project-based support, as some localities explicitly tie patent-related commitments to funding agreements.[222] For example, Article 10 of Zhengzhou's local patent law introduces a "staircase" mechanism in which government financing depends

inefficiencies in public expenditure contexts. Although that study does not specifically address patent metrics or Chinese innovation policy, its principal-agent framework provides a useful lens for understanding how quantifiable benchmarks—like patent indicators—may help improve monitoring and accountability).

[217] *Id.*

[218] *Id.* at 5.

[219] Gansusheng Zhuanli Tiaoli (甘肃省专利条例) [Regulations on Patents in Gansu Province] (promulgated by the Standing Comm. Gansu Province People's Cong., Nov. 25, 2022, effective Jan. 1, 2023), art. 35 (China).

[220] Liaoningsheng Zhuanli Tiaoli (辽宁省专利条例) [Regulations on Patents in Liaoning Province] (promulgated by the Standing Comm. Liaoning Province People's Cong., Apr. 21, 2022, effective Apr. 21, 2022), art. 29 (China).

[221] It helps because patent metrics provide a tangible, easily tracked output, namely the number and quality of patents. In a situation where the government lacks detailed insight into every step of a researcher's or firm's work, patent counts and related performance indicators act as a straightforward yardstick. They reduce some of the guesswork about whether the developer is channeling time, money, and effort into genuinely innovative projects or simply into routine tasks. Essentially, the government can look at the patents filed or granted and see a measurable result that suggests (though does not guarantee) productive research and development.

[222] Jian Xu, Xiuhua Wang & Feng Liu, *Government Subsidies, R&D Investment and Innovation Performance: Analysis from Pharmaceutical Sector in China*, 33 Tech. Analysis & Strategic Mgmt. 535, 549 (2021) ("Policymakers should make innovation-induced policies and supervise the actual input of these subsidies. For companies that fail to meet relevant standards, government should reduce the amount of subsidies and recover these funds").

on an organization's promise to file for patents.[223] If the recipient fails to follow through, the local government can bar it from future support for three years.[224] This deters moral hazard by linking patent commitments to ongoing funding eligibility, thereby encouraging recipients to maintain sufficient effort and resource allocation throughout the project's duration, and ultimately strengthening overall innovation governance.[225]

Fourth, by coupling state-driven incentives with market-based rewards, the coordinated patent regime helps to cultivate a robust intellectual property culture. This is an achievement of special significance for emerging economies with historically weaker IP systems. Research suggests a positive correlation between the magnitude of patent subsidies and the development of innovation actors' "patent awareness."[226] Empirical studies in regions such as the Pearl River Delta show that increased patent creation subsidies heighten entrepreneurs' consciousness of the patent system, while patent commercialization subsidies reinforce their focus on the downstream application of protected technologies.[227]

These advantages are closely linked. By systematically targeting market failures, enhancing policy coherence, improving innovation governance mechanisms, and fostering an IP-conscious environment, China's coordinated patent regime has established a new model of innovation governance. Although this system faces significant challenges — many of which the next sections will explore — it nonetheless provides fresh insights for countries seeking to strengthen their national innovation capabilities through a more integrated and strategically guided use of patent rights.

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[223] Zhengzhou Patent Law, *supra* note 148, at art. 10.

[224] *Id.*

[225] Takalo & Tanayama, *supra* note 123, at 18 ("As entrepreneurs anticipate that screening increases with the subsidy amount, larger subsidies can deter the entrepreneurs with low quality projects from applying. In other words, government project screening is more credible if it is accompanied with subsidy allocation").

[226] Chen Jun & Zhang Yunjun, *supra* note 121, at 92 (noting that there is a significant positive correlation between the level of patent funding and the patent awareness of entities engaging in innovation); Xiao Chunyan (肖春燕) & Fan Xinhui (范新晖), *Guangdong Zhishi Chanquan Zhuanli Zizhu Zhengce Xianzhuang yu Jianyi* (广东知识产权专利资助政策现状与建议) [Status and Recommendations for Guangdong Intellectual Property Patent Subsidy Policy], 30(5) Foshan Taoci [Foshan Ceramics] 40, 40 (2020) (noting that patent subsidy policies and incentives for high-tech enterprise recognition drove a rise in patent awareness among labor-intensive ceramic manufacturers around 2010).

[227] *See* Chen Jun & Zhang Yunjun, *supra* note 121, at 92.

### *B. Challenges*

Notwithstanding its merits, China's coordinated patent regime faces a series of systemic challenges that raise questions about its long-term sustainability and overall effect on innovation. The first and perhaps most pronounced concern stems from the risk that its incentive structures might produce distortions.[228] By tying patents to government resources and preferential policies, the system risks prompting an influx of strategically-motivated patent filings.[229] Several empirical studies confirm that the quality of patents is relatively low. For example, Dang and Motohashi found that local patent subsidy policies significantly increased application volumes but simultaneously reduced overall patent quality.[230] Pan and Kou report similar effects, with subsidies contributing to the proliferation of low-value patents.[231] Maintenance data point in the same direction: although invention patents carry a 20-year term, most expire within five years, only about 6% remain in force beyond a decade,[232] and in 2014 approximately 90% lapsed for nonpayment of fees, with roughly 2% reaching full term.[233] This data strongly suggest that many

[228] *See* Aaron R. Wininger, *China Continues Market Distorting Patent Subsidies*, SLWIP (May 4, 2024), https://www.slwip.com/resources/china-continues-market-distorting-patent-subsidies/ [https://perma.cc/SQ5E-4YX8]; Aaron R. Wininger, *USPTO Releases Report on Distortions Caused by Chinese Monetary Incentives for U.S. Filings*, CHINA IP LAW UPDATE (Jam. 13, 2021), https://www.chinaiplawupdate.com/2021/01/uspto-releases-report-on-distortions-caused-by-chinese-monetary-incentives-for-u-s-filings/ [https://perma.cc/M37U-RA4G]; *see also* USPTO, TRADEMARKS AND PATENTS IN CHINA: THE IMPACT OF NON-MARKET FACTORS ON FILING TRENDS AND IP SYSTEMS 8 (2021) (pointing out that subsidies and mandates in China raise doubts about the commercial value of its patents, which lag behind other countries in overseas filings and commercialization rates).

[229] Dang & Motohashi, *supra* note 19, at 151 ("By simulation, we find a more than 30% increase of patent counts driven by policy, and more importantly, deteriorated patent quality in narrower claims.").

[230] *Id.* ("[O]ur empirical study confirms a general concern that patent subsidies have side effects in that they encourage applications of lower quality."); *see also* DAN PRUD' HOMME, DULLING THE CUTTING EDGE: HOW PATENT-RELATED POLICIES AND PRACTICES HAMPER INNOVATION IN CHINA 1 (2012) (analyzing patent data in China indicates that while patent filings are expected to keep increasing, the quality of patents may continue to lag).

[231] Pan Yuzhang (盘宇章) & Kou Zonglai (寇宗来), *Chuangxin Zhengce Dui Zhongguo Shangshi Gongsi Zhuanli Xingwei de Yingxiang—Jiyu Zhuanli Shengchan Hanshu Guji* (创新政策对中国上市公司专利行为的影响—基于专利生产函数估计) [The Influence of Innovation Policy on the Patent Behavior of Chinese Listed Companies: Based on the Estimation of the Patent Production Function], 2015(3) CHANYE JINGJI YANJIU [Industrial Economics Research] 54, 61–62 (2015).

[232] Zhang, *supra* note 137, at 92.

[233] *Id.*

patents are driven more by policy-driven incentives than by genuine innovative activity.[234]

Second, the proliferation of lower-quality patents might contribute to the formation of "patent thickets" — dense clusters of overlapping intellectual property rights that complicate subsequent innovation.[235] Innovators often pursue patents for strategic rather than purely technological reasons, resulting in an increasingly complex legal landscape.[236] This trend not only places a heavier examination burden on patent offices[237] but also raises transaction costs for innovators, who must allocate additional resources to patent searches and analyses to avoid infringement.[238] When commercialization of products requires multiple permissions from separate patent holders, negotiations can become protracted and cumbersome. As a result, subsequent innovators can face a "patent assembly failure," abandoning otherwise valuable R&D projects because securing the necessary licenses has become be too difficult.[239] These challenges are especially

[234] Sun Yong, Ma Yuanting & Zhang Yafeng, *supra* note 183, at 200 ("For instance, the recognition of high-tech enterprises and the tax incentive policies associated with it clearly require companies to own a certain number of intellectual property rights .... Patent subsidies lower the cost of such speculative applications, making it more cost-effective for companies to engage in this behavior.").

[235] Shapiro, *supra* note 75, at 120 (suggesting that the patent system is creating a dense "patent thicket" of overlapping rights, where cumulative innovation and blocking patents risk stifling rather than encouraging technological progress).

[236] *See* Sun Yong, Ma Yuanting & Zhang Yafeng, *supra* note 183, at 200.

[237] Liu Xuefeng (刘雪凤), Qin Lichao (秦立超) & Zhang Xiao (张笑), *Zhuanli Zizhu Zhengce Duiyu Zhongguo Zhuanli Zhiliang de Yingxiang Yanjiu* (专利资助政策对于中国专利质量的影响研究) [Research on the Impact of Patent Subsidy Policy on the Quality of Chinese Patents], 2020(10) Qingbao Tansuo (情报探索) [Information Exploration] 89, 89 (2020); *see also* Zhen Lei, Zhen Sun & Brian Wright, *Patent Subsidy and Patent Filing in China*, Univ. of Cal., Berkley 1, 31 (2012) ("The social welfare effect of the subsidy program is likely to be negative. The extra applications, at the least, increased the workload of both the patentees and the patent office without contributing to more effective patenting"); *The Uncontrolled Growth of Patent Numbers in China and Its Consequences*, Nsfc.gov. (Jan. 15, 2018), https://www.nsfc.gov.cn/csc/20340/20289/20805/index.html [https://perma.cc/FE7Z-7423] (noting that the excessive number of patent applications places an overwhelming burden on examiners, making it difficult to ensure the quality of reviews).

[238] Shapiro, *supra* note 75, at 144 (noting that patent thicket creates substantial transaction costs for innovators trying to commercialize new technology, due to multiple patents, overlapping rights, and holdup issues).

[239] Yuan Xiaodong (袁晓东) & Cai Xuehui (蔡学辉), *Zhengce Yindao Chuangxin Moshi Xia de Zhuanli Jicheng Shibai Wenti Yanjiu* (政策引导创新模式下的专利集成失败问题研究) [Research on Patent Assembly Failure under the Policy-Oriented Innovation Model], 36(6) Kexuexue Yanjiu (科学学研究) [Studies in Science of Science] 967, 971 (2018); *see also* Michael Heller & Rebecca Eisenberg, *Can Patents*

significant in sectors where complex products rely on multiple incremental inventions, potentially hindering industrial progress and slowing technological upgrades.[240]

Third, the system's signaling function may weaken, undermining efficient resource allocation. As Clarisa Long notes, patents have traditionally signaled an entity's technical capabilities, guiding investment decisions.[241] Yet when state-provided incentives artificially inflate patenting, raw counts may no longer reliably indicate innovative strength.[242] In China, some firms prioritize meeting policy benchmarks, such as patent application quotas to access tax breaks or subsidies, over investing in meaningful R&D; in doing so, patents then risk becoming mere administrative token used to unlock state benefits rather than protect real technological innovation.[243] The result can mislead both policymakers and market participants, creating a feedback loop of incentive gaming and misallocation of resources. A surge of low-quality patents may even prompt government support into areas with little genuine innovation, further distorting the innovation ecosystem.[244]

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*Deter Innovation? The Anticommons in Biomedical Research*, 280 Sci. 698, 698 (1998) (arguing that the proliferation of patents can create an "anticommons," where fragmented intellectual property rights hinder downstream innovation and product development).

[240] Amit Makker, *The Nanotechnology Patent Thicket and the Path to Commercialization*, 84 S. Cal. L. Rev. 1163, 1176 (2011); Shapiro, *supra* note 75, at 126.

[241] Long, *supra* note 62, at 653.

[242] Dang & Motohashi, *supra* note 19, at 151.

[243] Liu, Qin & Zhang, *supra* note 237, at 93 (noting that some firms in China focus on securing tax breaks and subsidies through patent filings, rather than on pursuing genuine innovation or on industrializing technologies); Sun Yong, Ma Yuanting & Zhang Yafeng, *supra* note 183, at 199 (pointing out that the number of patents, symbolizing innovation and competitiveness, brings tangible and intangible benefits to firms, leading some to file patent applications not for authorization but merely to gain recognition, subsidies, or policy incentives by having their applications accepted or entering substantive examination); Mao Hao (毛昊) & Yin Zhifeng (尹志锋), *Wo Guo Qiye Zhuanli Weichi Shi Shichang Qudong Haishi Zhengce Qudong?* (我国企业专利维持是市场驱动还是政策驱动?) [Is the Maintenance of Chinese Enterprises' Patents Market-Driven or Policy-Driven?], 37(7) Keyan Guanli (科研管理) [Science Research Management] 134, 139 (2016) (pointing out that the primary motivation for a firm to maintain low-quality patents is often to meet government qualification requirements and secure subsidies, rather than to derive value through patent commercialization, reflecting a strategic use of policies rather than genuine innovation and market application).

[244] Xie Weifeng (谢伟峰), Wen Jiachun (文家春) & Yuan Xiaodong (袁晓东), *Fei Zhengchang Shenqing Zhuanli Xingwei Shizheng Yanjiu* (非正常申请专利行为实证研究) [An Empirical Study on Abnormal Patent Application Behavior], 42(5) Keji Guanli Yanjiu (科技管理研究) [Science and Technology Management Research] 179, 184 (2022); Mao Hao & Yin Zhifeng, *supra* note 243, at 134 (claiming that

Fourth, these distortions might harm the long-term cultivation of innovation capabilities.[245] In a conventional patent system, the main driver of patent value lies in the technology's utility and commercial appeal.[246] But under the coordinated model, the pursuit of government incentives can overshadow responsiveness to market demand, weakening the market's role in steering technological development.[247] Empirical indicators lend credence to these fears: Although China's patent filings have soared, patent-intensive industries account for only about 11% of GDP, far below the United States' 35% and the European Union's 39%.[248] Moreover, a 2017 CSIS report found that China's patent-licensing income was roughly 1.5% of that of the U.S.[249] Taken together, these figures suggest that China's expanding patent volume does not necessarily translate into comparable economic returns or high-quality innovation output.[250] Some observers argue that China's explosive growth in patent numbers has not been matched by comparable advances in innovation, highlighting persistent gaps in critical "bottleneck" technologies[251]—areas of technological weakness and

policy incentives might shift developers' focus from innovation value to preserving patent numbers, leading to resource misallocation and a negative effect on the innovation ecosystem).

[245] *Id.* (noting that the policy incentives might harm the market's inherent innovation capacity and institutional efficiency, potentially weakening the long-term cultivation of innovation capabilities).

[246] Hemel & Ouellette, *supra* note 8, at 327; Landes & Posner, *supra* note 42, at 23–24 (using willingness to pay to infer that "the market values the bridge more than alternatives"); Christopher Buccafusco & Jonathan S. Masur, Intellectual Property Law and the Promotion of Welfare, in RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW: VOL. 1 THEORY 98, 102 (2019) (contending that "owners of IP can only realize these profits if individuals are actually willing to purchase their products and services")

[247] *See* Mao Hao & Yin Zhifeng, *supra* note 243, at 134.

[248] Xu Wen, *supra* note 210, at 32.

[249] Scott Kennedy, The Fat Tech Dragon: Benchmarking China's Innovation Drive 28-29 (2017) (reporting that in 2015, China generated roughly RMB 11.7 billion (USD 1.75 billion) in patent licensing revenue, and RMB 9.25 billion (USD 1.38 billion) from sales of patent rights; by comparison, the United States saw IP licensing revenues of USD 115.2 billion in 2012).

[250] Margit Molnar & Hui Xu, Who Patents, How Much Is Real Invention and How Relevant? A Snapshot of Firms and Their Inventions Based on the 2016 SIPO China Patent Survey 3 (2019) ("China has surpassed the United States in patent applications and has become world leader. Strong patenting activity, however, did not lead to strong productivity growth.").

[251] Geng Deqiang (耿德强) & Wang Long (王龙), *Zhuanli Qudong Gao Jishu Chanye Chuangxin Fazhan de Jili, Lujing yu Zhengce Yanjiu* (专利驱动高技术产业创新发展的机理、路径与政策研究) [Mechanism, Path, and Policy Research on Patent-Driven Innovative Development of High-Tech Industries], 2022(4) Zhishi Chanquan (知识产权) [Intellectual Property] 112, 113 (2022).

dependence—that continue to constrain China's ability to climb higher on global value chains.[252]

Fifth, the coordinated system raises questions regarding China's commitments under international trade and IP agreements, particularly the national treatment principle.[253] Empirical studies note that local patent subsidy policies often restrict eligibility to locally registered firms or residents.[254] For instance, Shanghai enforces stringent criteria favoring local entities. Jiangsu adopts a relatively broader approach, but both limit subsidies to domestic applicants.[255] Such geographic limitations might conflict with China's WTO obligations or other treaty-based commitments that require equal treatment for foreign entities.[256]

In sum, while China's coordinated patent regime offers a novel strategy to promote innovation by orchestrating both state and market incentives, it also faces significant structural concerns regarding long-term sustainability and overall effectiveness. Recognizing these potential challenges is crucial for any comprehensive assessment of this model and its capacity to mobilize resources to achieve technological breakthroughs.

## IV
## Implications

China's coordinated patent regime offers both a powerful policy toolkit and a cautionary illustration of how linking patents with broad-based state support can simultaneously address key innovation bottlenecks and introduce new systemic strains. Far from a purely technical matter, these institutional arrangements reflect deeper questions about how society provides incentives for knowledge creation, commercializes discoveries, and structures long-term innovation capacity. This

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[252] *Id.*

[253] Siyuan An & Brian Peck, *China's Indigenous Innovation Policy in the Context of Its WTO Obligations and Commitments*, 42 Geo. J. Int'l L. 375, 384 (2011) (contending that local governments' subsidy practices represent "local protectionism" and might "run afoul of the non-discrimination principle" of the WTO, to which China belongs); Daniel CK Chow, *China's Indigenous Innovation Policies and the World Trade Organization*, 34 Nw. J. Int'l L. & Bus. 81, 81 (2013) (noting that critics in the U.S. Congress and industry groups argue that these subsidy policies are unfair, unlawful, and violate China's World Trade Organization commitments).

[254] Lin Deming & Wang Chunjie, *supr*a note 127, at 27.

[255] *Id.*

[256] *See* Siyuan An & Brian Peck, *supra* note 253, at 384; Daniel CK Chow, *supra* note 253, at 81.

Part considers two structural crossroads: how China's model might transmit state-allocation weaknesses into market mechanisms, and whether the country should decouple patents from government incentives or refine it through systematic upgrading.

### *A. Transmission of State-Allocation Weaknesses into Market Mechanisms*

China's coordinated patent regime is emblematic of a broader, state-driven approach to innovation—an approach that has yielded significant achievements in targeted sectors,[257] as the rapid development of the high-speed rail and the deployment of the BeiDou Navigation Satellite System exemplify.[258] This model, characterized by concentrated resources and top-down coordination, has proven effective in achieving rapid technological advancement within established paradigms.[259] Building on these achievements, China has now embarked on a novel experiment in innovation governance through its coordinated patent system, attempting to use patents as a linchpin through which to orchestrate a diverse array of innovation motivations. By intertwining governmental incentives with market forces, policymakers hope to overcome certain blind spots inherent in market-based frameworks. However, this same structure can import the weaknesses of state-directed resource allocation into mechanisms that normally rely on market signals—such as the patent system—particularly because breakthrough innovation depends on complex, dispersed knowledge that centralized processes struggle to aggregate and evaluate.

The limitations of state-directed resource allocation in the realm of innovation manifest themselves most acutely in the collection and processing

[257] Yan Ruifeng (闫瑞峰), *Keji Chuangxin Xinxing Juguo Tizhi: Lilun, Jingyan Yu Shijian* (科技创新新型举国体制：理论、经验与实践) [*The New National System for Science and Technology Innovation: Theory, Experience and Practice*], 6 Jingji Xuejia (经济学家) [Economist] 68, 68 (2022).

[258] Xiaodong & Xuehui, *supr*a note 239, at 967 (claiming that China's successes in high-speed rail and Beidou navigation demonstrate that public policy serves as a new driver of technological innovation).

[259] Lei Lifang et al., *Keji Juguo Tizhi De Neihan Yu Moshi* (科技举国体制的内涵与模式) [*The Connotation and Mode of "Whole-Nation System of Science and Technology"*], 38(11) Kexuexue Yanjiu (科学学研究) [Studies in Science of Science] 1921, 1922 (2020). *See generally*, Ping Gao, *Government in the Catching-up of Technology Innovation: Case of Administrative Intervention in China*, Tech. Forecasting & Soc. Change 4 (2015).

of information.[260] Several key concepts from economics and organizational theory illuminate this challenge. Hayek's "knowledge problem" underscores why central coordination, while excelling at channeling resources toward specified tasks, often struggles to nurture unpredictable, disruptive discoveries.[261] The knowledge that groundbreaking innovation requires is often tacit, dispersed, and context-dependent, making it difficult to aggregate and utilize effectively through centralized mechanisms.[262] Christensen's theory of disruptive innovation reinforces this point, demonstrating that creation frequently emerges from the fringes of the market.[263]

These theoretical insights find practical expression in the operational challenges that China's coordinated patent system faces. One recurring obstacle arises from government's tendency to oversimplify innovation objectives, which is a direct response to the government's limited capacity to gather and interpret the detailed, context-specific data that is necessary for effective resource allocation.[264] Following the central government's issuance of the National Medium- and Long-Term Plan for Science and Technology Development (2006–2020), many localities embraced straightforward performance metrics,[265] ranging from annual growth

[260] *See* F. A. Hayek, *The Use of Knowledge in Society*, 35 Am. Econ. Rev. 519, 524 (1945) ("We cannot expect that this problem will be solved by first communicating all this knowledge to a central board which, after integrating all knowledge, issues its orders.").

[261] Though it does not focus on patents per se, Hayek's seminal essay on decentralized information and the superiority of market processes for allocating resources supports a foundational theoretical backdrop for understanding why markets, rather than central planning might manage innovation—and thus patents—more effectively. *Id.* at 519 ("The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess.").

[262] *Id.* at 524; Kapczynski & Syed, *supra* note 77, at 1911–14; *see also* Gallini & Scotchmer, *supra* note 95, at 54–55 (highlighting that a key strength of the patent system is its ability to leverage the "superior knowledge" of private-sector actors, especially when firms hold essential insights into the costs and benefits of R&D investments, rather than relying on government sponsors).

[263] Clayton M. Christensen, The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail 210 (noting that innovation often stems from market exploration and real-world testing).

[264] Hayek, *supra* note 260, at 524 ("The statistics which such a central authority would have to use would have to be arrived at precisely by abstracting from minor differences between the things, by lumping together, as resources of one kind, items which differ as regards location, quality, and other particulars, in a way which may be very significant for the specific decision").

[265] Pan Yuzhang & Kou Zonglai, *supra* note 231, at 55–56.

targets for invention patents to fixed quotas for per capita patent filings.[266] These quantifiable indicators, while easy to track and communicate,[267] do not reliably capture the depth, quality, or real-world impact of the underlying research.[268] Consequently, measuring success by numerical patent thresholds elevates quantity at the expense of genuine technological advancement.[269]

The reliance on simplified metrics extends to the procedures employed at the local level. In many jurisdictions, patent subsidy applications face only minimal oversight. In Chongqing, for example, applicants need only submit basic fee forms and receipts; there is no requirement that they substantiate the technical merit of their inventions.[270] While it reduces administrative burdens, this streamlining inadvertently creates avenues for rent-seeking behavior. Innovators might be tempted to divide one invention into multiple patents, or to make marginal tweaks to previously disclosed technologies simply to inflate their patent counts and secure subsidies, rather than to protect genuinely novel advancements.[271]

[266] Xing Ruimiao (邢瑞淼), Yan Wenjun (闫文军) & Zhang Yafeng (张亚峰), *Zhongguo Zhuanli Zhengce de Yanjin Yanjiu* (中国专利政策的演进研究) [A Study on the Evolution of China's Patent Policy], 39(2) Kexuexue Yanjiu (科学学研究) [Studies in Science of Science] 264, 271 (2021); *see also* Hu, Zhang & Zhao, *supra* note 19, at 108 (noting that the 12th Five-Year Plan for Science and Technology Development (2011–2015) set a specific patent target, aiming to increase SIPO invention patents in force per 10,000 people from 1.7 in 2010 to 3.3 in 2015, prompting various levels of the Chinese government to implement incentives to encourage patent applications).

[267] *See* Jiang Nan (姜南), *Zizhu Yanfa, Zhengfu Zizhu Zhengce yu Chanye Chuangxin Fangxiang* (自主研发、政府资助政策与产业创新方向) [*Independent R&D, Government-Funded Policy and Industry Innovation Direction*], 34(3) Keji Jinbu yu Duice (科技进步与对策) [Science & Technology Progress and Policy] 49, 50 (2017) (noting that China led the world in patent applications, a feat largely driven by government initiatives; under national quantitative patent targets, local governments, tasked with meeting annual patent quotas set by higher authorities, transmitted these targets to subordinate levels, offering subsidies based on application numbers).

[268] Hu, Zhang & Zhao, *supra* note 19, at 107 (finding that non-innovation motives might have contributed significantly to the surge in patenting); *see also* Jia Lin, Ho-Mou Wu & Howei Wu, *Could Government Lead the Way? Evaluation of China's Patent Subsidy Policy on Patent Quality*, 69 China Econ. Rev. 101663, 101664 (2021) (noting that unlike other patent offices, the China National Intellectual Property Administration provides very limited information on the quality of its patents).

[269] Hu, Zhang & Zhao, *supra* note 19, at 107 (finding the weakening correlation between patents and both R&D and labor productivity).

[270] Lin Deming & Wang Chunjie, *supr*a note 127, at 28.

[271] *Id.*; Lei, Sun & Wright, *supra* note 237, at 29 ("It seems that applicants, lured by the high reward offered to granted patents, split their patents to get more applications granted and thus more rewards."); Xiao Chunyan & Fan Xinhui, *supra* note 226, at 41–42 (noting that some applicants prioritize the securing of subsidies over the protection of innovation, often producing "junk patents" or splitting inventions to maximize funding).

Limitations of the government's capacity to evaluate the merit and value of patents effectively further compounds these systemic issues. The principal-agent problem, a core concept in institutional economics, helps explain this challenge. When the government (the principal) delegates the task of innovation to firms and researchers (the agents), information asymmetry and misaligned incentives can lead to suboptimal outcomes; multitask settings amplify this problem, as Holmstrom and Milgrom point out.[272] When performance metrics focus on easily quantifiable outputs, like patent counts, they inadvertently divert effort from less measurable but equally crucial activities,[273] such as basic research or the development of market-driven innovations that are difficult to patent. Government officials often lack the specialized expertise to distinguish truly innovative, market-relevant technologies from administrative placeholders designed merely to meet policy targets.[274] The empirical studies of scholars such as Yang and Rui reveal how "pseudo high-tech enterprises" exploit these knowledge gaps, siphoning off benefits intended to reward genuine invention.[275]

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[272] Bengt Holmstrom & Paul Milgrom, *Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design*, 7 J.L. Econ. & Org. 24, 25 (1991).

[273] *Id.* at 25 (noting that when tasks involve multiple objectives, such as producing high-quality and high-volume output, focusing incentives on easily measurable metrics (e.g., piece rates for volume) can lead to the neglect of harder-to-measure goals, like quality); Xiao Chunyan & Fan Xinhui, *supra* note 226, at 42–43 (contending that since the implementation of patent funding policies, patent applications have increased, but quality has declined because local governments use application volume as a performance metric); Hu, Zhang & Zhao, *supra* note 19, at 111 ("As innovation figures more prominently in the evaluation of the performance of local government officials at various levels, patents have become an important performance indicator. The urge to boost their patent counts is likely to be greater in regions that had lagged in innovation and patenting.").

[274] Zhang Jie (张杰), *Zhongguo Zhuanli Zengzhang zhi "Mi"—Laizi Difang Zhengfu Zhengce Jili Shijiao de Weiguan Jingyan Zhengju* (中国专利增长之"谜"—来自地方政府政策激励视角的微观经验证据) [*The "Mystery" of Patent Growth in China—Micro Empirical Evidence from Local Government Innovation Incentive Policy*], 72(1) Wuhan Daxue Xuebao (Zhexue Shehui Kexue Ban) (武汉大学学报(哲学社会科学版]) [Wuhan University Journal (Philosophy and Social Science)] 85, 87 (2019); Liu Xuefeng (刘雪凤) & Zhang Xiao (张笑), *Zhengce Quanguocheng Shijiao Xia Zhuanli Zizhu Zhengce yu Shengyu Zhuanli Zhiliang de Guanlianxing Yanjiu* (政策全过程视角下专利资助政策与省域专利质量的关联性研究) [*Research on the Correlation between Patent Subsidy Policy and Provincial Patent Quality from the Perspective of Policy Whole Process*], 2021(9) Qingbao Tansuo (情报探索) [*Information Research*] 8, 14 (2021); *see also* Hu, Zhang & Zhao, *supra* note 19, at 108 (noting that the 12th Five-Year Plan for Science and Technology Development (2011–2015) set a specific patent target, aiming to increase SIPO invention patents in force per 10,000 people from 1.7 in 2010 to 3.3 in 2015, which prompted various levels of the Chinese government to implement incentives to encourage patent applications).

[275] Yang & Rui, *supra* note 187.

Taken together, these information and enforcement limitations weaken the connection between patent activity and genuine technological progress.[276] Attaining a more balanced approach requires refining evaluative criteria so that qualitative and contextual indicators, such as the technology's viability, potential impact, and actual commercialization results, carry weight alongside raw patent counts. It also requires that policymakers develop the expertise to distinguish substantive innovations from those that exist chiefly on paper. Without such reforms, the regime risks perpetuating a cycle in which localities chase patent metrics to satisfy administrative mandates, diverting attention and resources away from the kinds of research that fuel transformative breakthroughs.

### *B. Diverging Paths for Development: Decoupling or Upgrading*

As China's coordinated patent regime grapples with information-processing challenges, incentive distortions, and the broader tension between centralized direction and decentralized innovation, it stands at a crossroads. On the one hand, decoupling patents from government-driven incentives would reduce the state's direct influence over which technologies developers pursue and how these evolve, reverting to a more market-oriented framework.[277] On the other hand, upgrading the current system — through tighter quality controls, better evaluative metrics, and enhanced governance — would retain the existing linkage between patent rights and state support, while refining it to reduce undesirable outcomes.

#### *1. Decoupling*

The first prospective path, which this section explores, would sever the explicit connection between patents and government benefits, moving the system toward a more classical, hands-off approach. This proposal draws on the longstanding concern that layering government subsidies, procurement advantages, and performance quotas on top of the patent system can distort market signals

[276] Margit Molnar & Hui Xu, *supra* note 250.

[277] Zhu Xuezhong (朱雪忠) & Hu Cheng (胡成), *Zhuanli Shi Cedu Qiye Jishu Chuangxin Jixiao de Youxiao Gongju Ma?* (专利是测度企业技术创新绩效的有效工具吗?) [*Are Patents an Effective Tool for Measuring Enterprises' Technological Innovation Performance?*], 39(8) Kexuexue Yanjiu (科学学研究) [Studies in Science of Science] 1498, 1501 (2021) (claiming that government departments should phase out inappropriate patent subsidies and strengthen market-driven, innovation-focused patent applications that reflect genuine corporate innovation).

and encourage rent-seeking.[278] Empirical research by Liu Xuefeng and Zhang Xiao indicates that overly generous government interventions can create "abnormal profit spaces" that precipitate a regression in innovation capability.[279] By reducing the state's direct influence on innovation priorities, this approach seeks to restore the role of the patent system as a market mechanism to identify and reward technological advancements.

In practice, decoupling could involve multiple reforms. First, local authorities might eliminate or significantly reduce patent-application and patent-authorization subsidies. Second, government procurement and funding policies could shift away from prioritizing patented products as such, and focus instead on inherent technological and commercial merits, an approach that might discourage innovators from filing patents solely to unlock preferential treatment. Third, performance evaluations for officials, universities, and enterprises would cease to emphasize patent-related numerical goals.[280] This scenario would limit the state's role to creating an enabling environment: maintaining robust IP enforcement, funding technology trading platforms, and clarifying legal standards for patentability. In essence, market demand — measured through genuine commercial uptake — would become the main arbiter of a patent's value.

Recent policy announcements start to point in this direction. Since 2021, local authorities have begun abolishing application subsidies and plan to phase out authorization-stage subsidies by 2025, [281] following CNIPA guidance emphasizing "high-quality development" over quantity.[282] The directive also calls for "shift of

[278] *Cf.* Josh Lerner, *Government Incentives for Entrepreneurship*, *in* Innovation and Public Policy 213, 225 & 229 (Austan Goolsbee &Benjamin Jones eds., 2020) (suggesting that limited market understanding or non-economic motives often distort decisions about fund allocation and include an opacity that allows firms to hire lobbyists to secure awards).

[279] Liu & Zhang, *supra* note 274, at 15.

[280] *Cf.* Zhuanli Zhuanhua Yunyong Zhuanxiang Xingdong Fang'an (2023–2025 Nian) (专利转化运用专项行动方案(2023—2025年)) [Special Action Plan on the Transformation and Application of Patents (2023–2025)] (promulgated by the Gen. Off. of the St. Council, Oct. 19, 2023) (China) [hereinafter Special Action Plan on Patents] (stating that "financial support and reward policies must not be simplistically linked to the number of patents").

[281] Xie, Wen & Yuan, *supra* note 244, at 185.

[282] Guojia Zhishi Chanquan Ju Guanyu Chixu Yange Guifan Zhuanli Shenqing Xingwei de Tongzhi (国家知识产权局关于持续严格规范专利申请行为的通知) [Notice of the National Intellectual Property Administration on Continuously and Strictly Regulating Patent Application Practices] (promulgated by the Nat'l Intell. Prop. Admin., Jan. 25, 2022) (China).

emphasis toward high-quality development and correcting the overemphasis on quantity."[283] Some provinces and cities have also established technology trading centers aimed at encouraging patent transactions grounded in market needs rather than administrative quotas,[284] although there is little empirical evidence to show that such centers substantially improve the efficiency of patent transfer. Moreover, the broad array of state-driven incentives still exists, as does the reliance on patent counts for setting policy goals.[285] In other words, official policy has signaled a shift away from patent filing subsidies, but it has neither fundamentally dismantled the larger incentive infrastructure nor retreated from the use of quantitative benchmarks as a cornerstone of innovation governance.

It is also worth noting that such a reversion would depart from the official rhetoric emphasizing the integration of innovation incentives, as reflected in central policy directives. For example, the *National Intellectual Property Strategy Outline* underscores the coordinated use of financial, procurement, and industrial policies to accelerate the creation and utilization of intellectual property.[286] Similarly, the State Council General Office's *Special Action Plan on the Transformation and Application of Patents (2023–2025)* advocates the promotion of intellectual property exploitation with "integrated legislation."[287] Thus, while China's government has taken incremental steps to reduce patent subsidies and refine its patent-related programs, it has shown little inclination to abandon the fundamental logic of fusing patent rights with broader resource allocation measures.[288]

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[283] *Id.*

[284] Zhang, *supra* note 137, at 93.

[285] 2021 Outline, *supra* note 12 (planning that by 2025, the number of "high-value invention patents" per 10,000 people is expected to reach 12); The "14th Five-Year" IP Protection and Utilization Plan, *supra* note 11 (planning to increase the number of high-value invention patents per 10,000 people from 6.3 in 2020 to 12 in 2025, an accumulated growth of 5.7; and expecting overseas invention patent grants to rise from 40,000 in 2020 to 90,000 in 2025).

[286] 2008 Outline, *supra* note 12 (insisting on the promotion of the creation and utilization of intellectual property by "leveraging fiscal, financial, investment, government procurement, and industry, energy, and environmental protection policies to guide and support" market entities in developing and utilizing intellectual property).

[287] Special Action Plan on Patents, *supra* note 280 (emphasizing "comprehensive IP legislation" and promotion of patent protection and utilization "in an integrated manner").

[288] 2021 Outline, *supra* note 12 (promoting "the deep integration and development of intellectual property with the economy, science and technology, culture, and society").

### *2. Upgrading*

The second path envisions a systematic upgrading of China's current framework, seeking to refine, rather than abandon, the tight connection between patents and state incentives. This approach reflects the belief that a coordinated patent system, if managed judiciously, can channel resources toward genuinely useful technologies, without succumbing to the oversimplified metrics that the decoupling scenario seeks to avoid. Instead of dismantling the institutional ties between patent rights and public support, policymakers would introduce stricter quality controls, more nuanced evaluation mechanisms, and heightened transparency to mitigate rent-seeking and overreliance on patent counts.

Upgraded measures could begin with more stringent scrutiny for patents seeking state-backed benefits, elevating the thresholds beyond baseline patentability standards.[289] Several localities are already moving in this direction by experimenting with differentiated criteria. For instance, Jiangsu Province has at least one funding program that insists on "high commercialization potential and sound market prospects" before granting subsidies.[290] Hunan's approach further refines this logic by distinguishing between patents that have undergone partial commercialization and those that remain prospective, providing proportionate funding appropriately tailored to each category.[291] To address information asymmetries further, local authorities might integrate independent expert panels into their review processes, tying financial awards and procurement preferences to patents that exhibit verifiable social or economic value.[292] More robust verification processes, such as requiring documented economic gains

[289] Zhu & Hu, *supra* note 277, at 1501–02 (277 the use of multidimensional patent metrics, such as citation counts, litigation frequency, and the number of core patents, to evaluate technological innovation performance).

[290] Jiangsu IP Fund Regulation, *supra* note 132, at art. 6; *see also* Tianjin Patent Law, *supra* note 151, at art. 23.

[291] Xu Wen (徐文), *Linian yu Lujing: Gao Zhiliang Fazhan Shidai Zhuanli Zizhu Zhengce Zhuanxing Lun* (理念与路径：高质量发展时代专利资助政策转型论) [Concept and Path: On the Transformation of Patent Subsidy Policy in the Era of High-Quality Development], 2022(4) *Lilun Yuekan* (理论月刊) [Monthly Theory] 118, 126 (2022).

[292] For example, Guang'an City in Sichuan Province employs a "pre-industrialization" funding model, focusing on "market prospects" and "expected economic benefits" as key selection criteria, while Zhejiang Province adopts a "post-industrialization" funding model, emphasizing the substantive requirement of "achieving certain economic and social benefits." *Id.*

or authenticated endorsements from industry experts, could ensure that public support aligns with genuine societal demands. In principle, such an upgraded system would harness the state's strategic vision without letting raw patent tallies eclipse the deeper pursuit of transformative innovation.

Yet even a significantly retooled framework cannot fully overcome the knowledge problem that Friedrich Hayek described.[293] Innovation-related knowledge remains scattered and tacit, and no central authority, however well-intentioned, can fully grasp the subtle, emergent contours of innovation.[294] Moreover, these enhanced rules might still distort market signals by rewarding inventions that match state priorities rather than the genuine demands of potential technology users. Still, upgrading offers a realistic middle ground for a government reluctant to relinquish the integration of patents with other innovation-incentivizing measures.

In sum, China's government must choose between these two paths. Decoupling would roll back the state's ambitious blueprint for coordinated innovation and reset the patent system to a more classical market-driven paradigm, at the cost of relinquishing much of the strategic guidance and pooled resources that have characterized recent industrial policy. Upgrading, in contrast, promises to fine-tune the existing model in ways that minimize inappropriate incentives and improve evaluative rigor, while preserving the synergy between patents and state-backed initiatives. But this cannot fully resolve the tension between top-down management and decentralized, market-based discovery.

In negotiating this fundamental crossroads, China stands to influence not only its own trajectory toward high-tech development, but also the evolving global conversation about how best to nurture meaningful, transformative innovation in an era of intensive technological competition.

## Conclusion

China's coordinated patent system represents a deliberate effort to bring innovative activity under a more unified institutional design. Unlike the predominantly market-driven U.S. framework, in which patents primarily function as vehicles for private-sector R&D and knowledge dissemination, China's approach

[293] Hayek, *supra* note 260, at 534.

[294] Kapczynski & Syed, *supra* note 77, at 1911–14; Gallini & Scotchmer, supra note 95, at 54–55.

integrates patents into a broader matrix of both market-oriented and governmental incentives. Patents thus become more than exclusive rights that reward inventors; they serve as conduits linking government funding, procurement benefits, tax relief, and regulatory support in pursuit of robust innovative capacity. By placing patents at the intersection of fiscal and regulatory measures and market forces, this system aspires to reduce the inefficiencies that often hinder the transition from invention to application.

This analysis shows both the distinctive benefits this approach offers, while also exposing its structural challenges. On the one hand, aligning government resources with patent rights can help bridge gaps that typically stymie early-stage research and development, particularly for smaller enterprises. It can also facilitate deeper coordination among policy tools, thereby minimizing fragmentation and laying a more coherent groundwork for sustained technological progress. Yet the same mechanisms that intensify patent creation can also encourage filings of marginal quality, limit the genuine signaling function that patents provide, and risk creating dense clusters of overlapping rights. These issues become more pronounced when the system evaluates patent counts as performance measures, which undermines the original purpose of stimulating meaningful innovation.

This study highlights the ways by which consolidating patent-based incentives with governmental support can produce both promising outcomes and unintended inefficiencies — especially when weaknesses in state-level resource allocation carry over into the marketplace. At present, China must choose between "decoupling" its patent regime from public incentives and shifting toward a model rooted more firmly in market signals, or "upgrading" the existing framework through stricter quality controls, more refined evaluation metrics, and enhanced transparency. These decisions have practical ramifications for China's technological trajectory. They also enrich the broader discussions about the interplay between state support and market-based innovation. By demonstrating how patents can function as institutional linchpins within broader reform agendas, this Article offers new perspectives on how different regimes — and potentially other jurisdictions — can shape policies to cultivate technological growth.