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From the Editors

Advancing China Policy Studies: Global Dialogue, Local Insights, and Collective Problem-Solving

Lili Liu

The study of public policy has entered a transformative era, one defined by rising global complexity, transboundary governance challenges, and the need to move beyond Western-centric theoretical paradigms. This landscape calls for a mode of global dialogue that bridges regional boundaries and local insights that ground theory into governance realities. It further requires a commitment to collective problem-solving that addresses the shared challenges of our interdependent world. In this spirit, China's longstanding practices of policy experimentation, hierarchical coordination and adaptive implementation offer an indispensable empirical setting to reexamine public policy theory for a global age.

This vision finds powerful resonance in the 2nd International Conference on China Policy Studies (ICCPS 2025), held from June 6-8, 2025, at Beijing Normal University, China. Co-organized by the School of Government at Beijing Normal University and the Chinese Policy Scholars Group (CPSG), the conference brought together nearly 300 scholars from more than 70 leading institutions worldwide. Under the theme "*Advancing Policy Studies: Addressing Conventional Issues and Emerging Challenges in Global Transformation*," ICCPS 2025 fostered deep exchanges on how China's policy experience can inform global responses to climate change, digital governance, regional integration, and social development. As the supporting journal for the conference, we are delighted to introduce this issue of *China Policy Journal*. This issue features five outstanding articles on a variety of different topics and authored by scholars from multiple continents. Together, these works strengthen theoretical dialogue between China and the world, produce rigorous evidence on China's policy processes, and explore collaborative solutions to real-world governance challenges.

This issue opens with a contribution by Prof. Gwen Arnold from University of California-Davis, which redefines the normative priorities of contemporary policy research. Titled "Human Agency, Negative Cases, and Public Problem-Solving: Priorities for Public Policy Scholarship in China and Globally in the 21st Century," Arnold's paper identifies three theoretical and methodological shifts for the field: centering human agency in public policy scholarship, learning from negative policy outcomes, and moving beyond problem diagnosis to analyze how societies collectively solve public problems. Arnold points out that Western policy theories are mostly based on the context of developed democracies, while

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China's political system and multi-level governance structure provide a unique perspective for testing and improving the generalizability of policy theories. By challenging the overemphasis on large-scale data, Arnold highlights the unique value of qualitative research in exploring human motivation and behavior logic (Ostrom, 2005). Meanwhile, the study stresses that only by paying attention to negative cases of policy failure can we truly improve the rigor of policy theory and clarify the boundary conditions of policy effectiveness (McConnell, 2010; Bovens & Hart, 2016).

This article breaks through the limitations of Western-centric policy research paradigms, highlights the unique advantages of China's research context, and provides a clear theoretical guidance for global public policy scholarship. It demonstrates how China's layered governance and longstanding experimental tradition provide fertile ground to explain the motivational, relational, and strategic dimensions of policy action (Lipsky, 1980; Kingdon, 1984; Yi et al., 2024).

Next, Shaohua Wei's and Huang Ding's article, "How Do Local Governments Collaborate Across Levels? An Evolutionary Game Theory Analysis of Policy Demonstrations in China" explores the cross-level collaboration mechanism of China's policy demonstration. Research on China's policy experimentation has not only served as a central instrument to policy innovation but also created institutional space for local governments to explore, adjust, and raise effective policy solutions (Heilmann, 2008; Teets & Hasmath, 2020). However, previous research has failed to examine how these cross-level interactions evolve dynamically. Wei and Ding's article fills this gap by developing an evolutionary game model to examine strategic interactions among provincial, municipal and district government. It demonstrates that stable cross-level collaboration emerges from structured provincial leadership, municipal coordinative hub functions, and district-level responsiveness to grassroots feedback, sustained by institutionalized incentives and resource coordination.

This article makes a significant contribution to the understanding of China's policy experimentation and cross-level collaborative governance by illustrating the endogenous evolutionary dynamics of local governance in China. As the advancement of policy experimentation relies on the active participation of local governments at multiple level, this research offers valuable insights into the dynamics of policy demonstrations and policy innovation in contemporary China.

The third article, "Integrating Quantity and Quality: Evidence from Water Rights Trading's Dual Policy Effects on Water-Use Efficiency and Water Environmental Quality" by Rui Bao and Jingjing Zeng, uses the difference-in-differences (DID) and synthetic control methods (SCM) to evaluate the implementation effect of China's water rights trading policy. Based on panel data of 31 provinces from 2003 to 2023, the study finds that water rights trading significantly improves water-use efficiency by 25.6% and promotes water quality improvement in some pilot

areas by enhancing water governance intensity. The mechanism test shows that efficiency improvement comes from water use structure optimization, while quality improvement relies on strengthened governance intensity.

Different from previous studies that focus on the quantitative effect of water rights trading (Ma et al., 2020; Zhang et al., 2021), this paper integrates the dual dimensions of water quantity and quality, verifies the effectiveness of market-oriented environmental policy tools, and provides empirical support for water governance in water-scarce regions. The findings that the improvement in water quality associated with strengthened governance efforts, clarify the causal mechanisms and conditional effectiveness of market-oriented environmental instruments, offering robust empirical insights for global water governance.

Shifting the focus to the regional level, the fourth article, "From Fragmentation to Synergy: Financial Policy Coordination in the Western Greater Bay Area" by Xinyu Zhang, Kexin Deng and Bo Wen, uses the mixed research method of a content analysis and in-depth interviews to examine the state of policy coordination in the western Guangdong-Hongkong-Macao Greater Bay Area (GBA)'s financial sector. Based on Institutional Collective Action (ICA) and policy instrument theory (Feiock & Scholz, 2009; Rothwell & Zegveld, 1981), the article constructs a "policy instrument-innovation value chain" analysis framework and finds that the current regional financial policy over-relies on environmental-side instruments, while supply-side and demand-side instruments are seriously insufficient, leading to policy fragmentation and coordination dilemmas. Hence, the authors propose to build a multi-level coordination mechanism to address institutional barriers under the "One Country, Two Systems" framework.

This study builds on the work of cross-sectoral policy coordination and integration (Trein et al, 2019; Bowman and Parsons, 2013; Duit, 2016; Adam et al., 2018) and offers evidence-based insights into how coordinated industrial development might be achieved, shedding light on the mechanisms that drive or impede policy coordination in one of China's most significant regional integration efforts. This study not only enriches the theoretical research on cross-border regional policy coordination but also provides practical pathways for the high-quality integrated development of the GBA.

The issue closes with a contribution by the editorial team of our sister journal, *Policy Studies Journal*, which calls for a more inclusive global future for policy research. Editor-in-Chief of *Policy Studies Journal, Prof.* Geoboo Song and his colleagues, in their paper titled "Beyond Borders: Empowering Policy Scholarship in China and the Global South," assess the development dilemma and breakthrough path of policy research in China and the Global South. The article states that China has made remarkable progress in policy research in recent years (Xiao and Yi, 2024; Cao et al., 2025), and reviews the remarkable progress made by Chinese scholars in policy process theories such as the Advocacy Coalition Framework

(ACF) and Punctuated Equilibrium Theory (PET) in recent years (Li & Weible, 2021; Van den Dool & Li, 2023). This article also points out that language barriers, institutional assessment incentives, and academic network isolation are still principal factors negatively impacting Chinese scholars' global participation.

This study argues that strengthening transnational research collaboration, especially South-South cooperation, and China-West academic dialogue, can enrich policy theory perspectives and jointly respond to global challenges such as climate change and public health crises. The authors provide an important roadmap to foster structured and sustained research collaborations and promote the transformation of global policy scholarship to a diversified model. Through collaborations with scholars from the Global South, China can play a more central role in advancing policy theories that reflect governance realities across diverse political and institutional contexts.

Together, these five articles in this issue highlight the significant strides China policy studies has made in recent years, both in theoretical innovation and empirical rigor, while also pointing to a vibrant and promising future for the field. They provide valuable insights for scholars, policymakers, and practitioners seeking to better understand China's public policy, challenge the limits of Western-dominated paradigms, and address shared global challenges. In doing so, they enrich our collective efforts to pursue more inclusive and collaborative policy scholarship.

China Policy Journal remains committed to our mission of advancing rigorous and open policy research. We will continue to publish and highlight cutting-edge research on China policy studies, encourage theoretical and methodological innovation, integrates China-focused research into broader public policy debates, and serve as a high-level platform for constructive dialogue between scholars in China and around the world. We extend our sincere gratitude to all authors, reviewers, and editorial board members for their invaluable contributions. We look forward to continuing to build a vibrant, globally engaged community of China policy research.

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Human Agency, Negative Cases, and Public Problem-Solving: Priorities for Public Policy Scholarship in China and Globally in the 21st Century

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Abstract

Public policy scholarship is increasingly flourishing in China, opening up possibilities for understanding governance dynamics in a cultural context and political system too long overlooked by western scholars. There are rich opportunities for exploring the extent to which policy theories crafted in developed democracies apply or should be changed to have relevance in developing countries and non-Western political systems. Science advances when the generalizability of theories and findings can be tested across diverse contexts; thus, scholars in China and around the world gain from the flourishing of Chinese policy scholarship. Here, I elaborate on three theoretical and methodological priorities that appear increasingly pressing as our field of study deepens and broadens: The importance of centering human agency in public policy scholarship, the value of studying and learning from negative policy outcomes, and the need to move beyond diagnosing public problems to investigating how people collectively solve such problems. Along the way, I highlight works from Chinese policy scholars that address these priorities and ways in which scholarship on China is uniquely posited to tackle them.

Keywords: human agency, negative cases, policy process, qualitative research

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Agencia humana, casos negativos y resolución de problemas públicos: prioridades para la investigación en políticas públicas en China y el mundo en el siglo XXI

Resumen

La investigación sobre políticas públicas está en auge en China, lo que abre posibilidades para comprender la dinámica de la gobernanza en un contexto cultural y un sistema político que la academia occidental ha pasado por alto durante demasiado tiempo. Existen importantes oportunidades para explorar hasta qué punto las teorías políticas elaboradas en democracias desarrolladas se aplican o deberían modificarse para ser relevantes en países en desarrollo y sistemas políticos no occidentales. La ciencia avanza cuando la generalización de teorías y hallazgos puede comprobarse en diversos contextos; por lo tanto, la academia en China y en todo el mundo se beneficia del auge de la investigación sobre políticas chinas. En este artículo, desarrollo tres prioridades teóricas y metodológicas que parecen cada vez más urgentes a medida que nuestro campo de estudio se profundiza y amplía: la importancia de centrar la agencia humana en la investigación sobre políticas públicas, el valor de estudiar y aprender de los resultados negativos de las políticas, y la necesidad de ir más allá del diagnóstico de problemas públicos para investigar cómo las personas los resuelven colectivamente. A lo largo del camino, destaco trabajos de académicos de políticas chinos que abordan estas prioridades y las formas en que la investigación sobre China está excepcionalmente posicionada para abordarlas.

Palabras clave: agencia humana, casos negativos, proceso de políticas, investigación cualitativa

人类能动性、反面案例与公共问题解决：21世纪中国及全球公共政策研究的优先事项

摘要

公共政策研究在中国蓬勃发展，为“理解长期以来被西方学者忽视的文化情境和政治体系下的治理动态”提供了契机。大量机会能用于探究发达民主国家构建的政策理论在发展中国家和非西方政治体系中的适用性，或者是否需要进行调整

以使其具有现实意义。当理论和研究成果的普适性能够在不同情境下得到检验时，科学会取得进步；因此，中国乃至世界各地的学者都受益于中国政策研究的蓬勃发展。随着研究领域的深化和拓展，我阐述了三个日益紧迫的理论重点和方法论重点：“在公共政策研究中以人类能动性为中心”的重要性；“研究和借鉴负面政策结果”的价值；以及需要超越对公共问题的诊断，转而探究人们如何集体解决这些问题。在此过程中，我将重点介绍中国政策学者针对这些重点所做的研究，以及中国研究如何以独特的视角来应对这些问题。

关键词：人类能动性，反面案例，政策过程，定性研究

This is an exciting time for policy scholarship in China. Chinese scholars are increasingly producing theoretically valuable and methodologically rigorous work investigating policy processes and outcomes, both within China and internationally. Not only is this development valuable for China's policymakers, who benefit from increasing availability of evidence evaluating the design and impact of public programs, but it is also enormously valuable for the wider academic community. Many theories of the policy process were developed by western scholars who built into these theories assumptions based on the functioning of liberal developed democracies. The extent to which these theories explain policy processes in developing, less democratic contexts has been explored only minimally. Yet doing so is crucial. More than 80 percent of people around the world live in developing countries (Gerszon Mahler et al. 2024). The majority of the world's population resides in countries with non-democratic political systems (EIU 2024). China alone represents roughly 17 percent of the world's population. The dominant traditions of policy scholarship thus have a troubling blind spot. The point of policy scholarship is to produce data and analysis that help people better understand their world and improve public decision-making. We as policy scholars have to grapple with how differences in political systems and cultures affect residents' lived experiences and governance processes and outcomes.

Several dimensions of China's political system offer scholars opportunities to gain insights into questions of long-standing theoretical interest. China's 34 province-level administrative units, more than 300 prefectures, nearly 3,000 counties, more than 40,000 townships, and many thousands of villages can yield nuanced data on multi-level governance processes, helping scholars understand how to encourage communication and collaboration across scales and among jurisdictions of widely diverse capacities (Croese et al. 2021). They also offer fertile ground for studying policy diffusion, experimentation,

and learning through a comparative lens. Scholars might explore, for example, the understudied question of what factors facilitate a jurisdiction's uptake of complex policy innovations traditionally viewed as difficult to diffuse (Makse and Volden 2011; Kaine and Wright 2022) or could develop fine-grained indices for measuring success in policy experimentation across variegated contexts (Mattocks 2025). Studying dynamics of authority and accountability between officials at different levels of government can yield important insights about principal-agent relationships. Scholars often conceptualize these as bilevel, but the China case highlights the importance of studying how upper-level principals try to shape behavior across linked chains of lower-level principal-agent sets (Xu et al. 2025). The relative lack of bottom-up accountability mechanisms (i.e., voting) in the Chinese political system opens up avenues for studying how officials can be incentivized to improve governance in the absence of such pressures (Hou et al. 2022) or how, when, and why officials gauge and respond to public concerns (e.g., Fan et al. 2018).

As our field of study deepens and broadens, attracting talented scholars in China and the developing world, there are three theoretical and methodological priorities that I view as increasingly pressing: Centering human agency in public policy scholarship, studying and learning from negative policy outcomes, and moving beyond diagnosing public problems to investigating how people collectively solve such problems. These priorities confront all policy scholars, not just those working in or studying China. However, research on China can uniquely help address these priorities. The rest of this paper elaborates on these topics, aiming to improve the rigor and usefulness of our collective research enterprise.

First is the priority of studying human agency and its consequences. Conceptually, this is not novel; policy scholars have long recognized the role of street-level bureaucrats in steering policy implementation (Weatherly and Lipsky 1977), policy entrepreneurs in strategically shaping public agendas (Kingdon 1984), and advocates forming coalitions to seek policy change (Sabatier and Weible 2007), among others. What is novel is the magnitude of forces pushing scholars away from studying individuals. These forces influence both the methods and topics scholars choose. Methodologically, powerful computational technologies, alongside massive datasets describing all facets of human behavior and decision-making, are transforming what is possible to achieve with empirical analysis. We can build and run more sophisticated quantitative models than ever before, with greater predictive capacity and accuracy. Often, our models examine how outcomes are affected by attributes amenable to analysis using secondary data, like form of government, economic conditions, or public sentiment. Large language models (LLMs) allow scholars to analyze corpuses of millions of policy documents (e.g., Fang et al. 2025). Online survey platforms like Baidu or MTurk give researchers rapid, relatively low-cost tools for gathering data from large

samples and performing survey experiments offering respondents hypothetical choice scenarios. These approaches are appealing to empiricists hungry for data and analytical innovation and help explain why academic publishing is accelerating in rate and increasing in volume (Moorehouse 2024). Substantively, the ways in which information technologies and architecture are transforming governance is a hot academic topic. Literature is rapidly growing around the ways in which governments use algorithms, often informed by artificial intelligence (AI), to structure how citizens interact with the public sector, prioritize who receives public services and how, and "nudge" citizens towards preferred behaviors (e.g., Calboli and Engelen 2025). Growing too is scholarship around how algorithms shape, potentially in biased ways, the information government decision-makers access and policy solutions they pursue (e.g., Panch et al. 2019).

Scholars should certainly pursue exciting data and innovate in its analysis, and study phenomena, like AI, transforming political and socioeconomic landscapes. My concern is that these foci direct academic attention away from the creative and strategic powerful governance choices made by humans, in at least three ways. First is the "streetlight effect," wherein the approaches scholars choose affect what they find. If we mainly study policy processes in ways amenable to large-scale computational analysis, using secondary data or decontextualized survey responses, we will be challenged to learn about how the strategic actions of individuals, from policy entrepreneurs to politicians to ordinary citizens, influence governance processes and outcomes. To the extent that there are systematic patterns in the ways individuals strategically engage the policy process (and plenty of literature suggests there are), our analyses will be systematically biased.

A second, related concern revolves around the difference between what occurs in the "world of action" (E. Ostrom 2005) and the "world of information." The factors that shape policy processes and outcomes—versus those that can be documented with "10,000-foot" data collected from policy documents, digital footprints, marketplace transactions, and observation of behavior trails in large samples—are not necessarily the same. Many important political decisions are made in backrooms and hallways where there is no official documentation. How individuals respond to hypothetical choice scenarios in an online survey experiment may diverge substantially from how they respond to in the real world. The way government officials actually make and implement policy often differ from than rules and procedures written into formal plans and constitutions that can be analyzed (for example) by LLMs; E. Ostrom (2005) called this the difference between "rules in form" and "rules in use."

Third, scholars studying how algorithms shape citizen behavior and policymaker responses are not necessarily studying algorithmic creators themselves, some of whom may be in the public sector, but many more of

whom operate in the private sector and market their products to governments. Yet such investigation is needed. Humans make decisions about where and how to collect data that form the massive databases scholars now analyze, and not merely on the basis of costs and benefits; their choices are shaped by personal and professional values, biases, and goals. Humans build assumptions about human nature and causal processes into computational models. Human policymakers choose when and where to deploy algorithms to automate some policy activities versus where to retain discretion. These choices have political motivations and political consequences and thus require serious scrutiny by policy scholars.

China offers a particularly compelling context for researchers to tackle these concerns, for at least two reasons. First, the country is a world leader in digitation, automation, and advanced technology. It is the world's largest e-commerce market (ITA 2025), has the most 5G stations and more than half of the world's 5G users (Moises 2023); and most basic government services can be accessed online (Li 2021). Digital penetration in China also allows the central government to collect a wide range of data about individuals, from purchases to movement and locations to the contents of digital communication (Davies 2021). The richness of this data infrastructure offers, in parallel, a target-rich environment for scholars to use case studies, interviews, ethnography, and process tracing to explore the agentic spaces that individuals carve out within these systems and strategies they use to this end. An excellent example is a 2025 paper by Ye and Xue in *Governance*. The authors examine how experts shape public policy in China, using interviews with researchers at government-funded thinktanks and analyzing documents they produce to reveal how "hidden" policy entrepreneurs influence policy agenda-setting, formulation, implementation, and adjustment. Similarly, the diversity of digital algorithms being deployed for so many purposes in China offers, in theory, myriad opportunities to interrogate how algorithmic creators decide to build out their platforms and the goals and values that influence their choices. One challenge, discussed further below, is algorithmic creators may be unwilling to disclose these procedures.

Second, personal ties are an important mechanism that political actors in China leverage for securing professional promotion and policy influence. Personal networks form based on shared background or education, professional training, and iterated interaction (Yang et al. 2018). There are thus rich opportunities to examine how "rules in use" shape governance processes and outcomes in ways not necessarily accounted for by "rules in form." For example, in their 2024 paper in *Public Administration*, Yi and coauthors study how local government officials in China develop interlocal networks for policy learning and information-sharing. Past experiences of local officials, including where they worked and with whom, affect their choice of cities to look to when seeking to learn about a new policy issue. The authors also show

that when high-level officials like move postings between jurisdictions, they foster learning connections across jurisdictional boundaries. By studying relatively informal human relationships, Yi and coauthors improve knowledge about how formal policy instruments move across landscapes. We need more work like this.

A perspective on policy scholarship that centers human agency inquires after strategies used by elites, government officials, and citizens to influence policy decision-making. What approaches are more efficacious, when, and for whom? It asks how the stories humans tell about our lives and governing institutions affect policy viewpoints, building or diminishing civic efficacy or advantaging some social groups and disadvantaging others. This perspective asks why people take on leadership roles in social movements or advocacy campaigns despite real personal costs. Just as important is understanding why people stop engaging in advocacy or step back from leadership roles, because this helps us understand the determinants of civic engagement. Centering human agency involves studying how formal and informal networks shape who we communicate with, the information and resources we can access, and how we process that information and deploy those resources. It asks how people who implement policy shape and even remake public programs during implementation, informed by their own worldviews.

Questions around human agency can be explored with varied research methods, but I want to highlight the particular importance of qualitative research. The inner worlds of humans are difficult, if not impossible, to understand using only behavioral observations or trends in secondary data. Motivation drives agentic choices, but motivation is a complex phenomenon best interrogated by directly engaging people in conversations that can reveal and elaborate this complexity. The problem is that qualitative research takes time and energy and, frankly, is not prioritized by many current models of academic publishing. It can be difficult and time-consuming to identify people who can offer insights into social dilemmas, develop trusting relationships with them, and learn from their experiences. But we can and should do hard things. There is much wisdom to the widely accepted argument that researchers should use both quantitative and qualitative methods to triangulate and increase confidence in their findings. I am increasingly of the viewpoint, though, that qualitative approaches have an important function that is more encompassing—and perhaps more important—than collecting data for any particular research project. Qualitative approaches, done well, treat humans as humans, inherently worthy of dignity and respect. These approaches recognize that people are more than data points. All research modalities have the potential to be extractive, gobbling up data without giving research subjects anything meaningful in return. But qualitative research at least points a researcher toward a possibly less extractive path; by investing their

own time in forging relationships, the researcher gives something valuable to the research subject. This, in turn, signals that the research subject is themselves valuable. Qualitative research, as a practice, pushes back against the increasing depersonalization and atomization of our world.

There is already a strong tradition of qualitative research in China, particularly fieldwork aiming to understand the circumstances of the country's large rural population and their experiences with policy interventions to reduce poverty and increase development (Hsiung 2015). My aim is to underscore the ongoing importance of this work in the face of incentives encouraging researchers to instead pursue computationally intensive analyses of secondary data. It is also important for scholars from outside of China, who are increasingly drawn to the country's opportunities for research, to recognize realities that affect qualitative research in a Chinese context. In an environment where certain topics are perceived as sensitive, individuals often align their expressed opinion with established positions (Lowell et al. 2024). Tensions between China and other countries may make research subjects reluctant to engage with researchers from outside China. Personal connections can allay some of these difficulties, but researchers from outside of China often lack extensive or strong personal networks in-country (Ying Yang and Le 2008). Language barriers and potential for intercultural misunderstandings pose additional barriers. For these reasons, international researchers pursuing qualitative research should seek meaningful collaborations with Chinese scholars who have on-the-ground knowledge, cultural fluency, facilitative social networks, and political situational awareness. Chinese collaborators can assess which kinds of research questions can (not) be pursued, and how; they also are best positioned to shape research so that it provides real benefits to subjects.

My second point is that we need to pay more attention to negative cases—situations when policy efforts go awry—if we are going to make policy theories rigorous and distinguish more impactful interventions from less. This is not a theoretical point as much as a methodological one. That is, there is a literature wherein scholars seek to define policy failure, develop typologies capturing its diverse dimensions, and theorize about how policy failures manifest (e.g., McConnell 2010; Bovens and 't Hart 2016). This literature is relatively small and deserves more attention. My focus here, though, is on scholars whose main interest is not elaborating the concept of policy failure, but who nonetheless encounter it in their empirical work. Our scholarship is full of studies examining when and why governments adopt laws; how legislators got an issue on the public agenda or secured policy adoption; and how advocacy groups cultivate networks of supporters, among others. We less commonly see studies examining when and why jurisdictions try but fail to adopt a law, what tactics tend to be less successful for legislators trying to get a policy adopted, the conditions under which policy advocates experience defeat, or

why efforts to build coalitions falter. There are several practical reasons for this. First, these negative cases can be difficult to study because people involved with them may be embarrassed, frustrated, or tired, and thus disinclined to share insights into what went wrong. Second, it also may be difficult to identify relevant informants (e.g., the puzzle of how to search for people who might have attended a protest but decided not to) or data sources (e.g., websites for a failed electoral campaign may not be maintained after the campaign's loss). Yet is critical that researchers devote effort to overcoming these obstacles.

Policymakers generally want to know how to create societally beneficial outcomes and avoid negative ones, so from an end-use perspective, it is a problem that we as scholars focus more on answering the first question than the second. Understanding negative cases also matters for efforts at building strong policy theory. The point of theory is to develop generalizable expectations, so that we aren't tackling every problem anew, but rather can apply insights to classes of cases or processes. Empirical testing helps us understand which cases or processes a theory can explain and relevant scope conditions. But if we do not develop theories about why policy efforts falter, and do not test that theory across a range of cases, we are left with a situation in which every policy misstep appears particularistic and unique, and we cannot learn from it. This is specifically a call for scholars of leading theories of the policy process, like Advocacy Coalitions Framework (ACF) or Multiple Streams Framework (MSF) or Social Construction Theory (SCT), among many others, to pay more attention to negative cases in order to develop and test theory-rooted explanations for phenomena like a policy coalition failing to achieve subsystem dominance (ACF), a window for policy change failing to open (MSF), or an advantaged group failing to secure policy benefits (SCT) (see Weible 2023).

Unless researchers explicitly study negative cases, they cannot know whether factors they identify as driving positive outcomes actually are determinative. For example, much of my own research concerns policy entrepreneurs (e.g., Arnold 2021). There is an extensive literature on these strategic political actors, the vast majority qualitative case studies describing positive cases wherein policy entrepreneurs achieved their goals. Studies often show that these individuals build networks of committed supporters; frame societal problems to favor their proposed solutions; are sociable and empathetic, grasping the needs and motivations of people they seek to persuade; and invest in pilot or demonstration projects that can yield evidence supporting their policy proposal (Petridou and Mintrom 2021). Consequently, these are the strategies that scholars often recommend people pursue to influence policy. But because it is rare for scholars to examine cases of unsuccessful policy entrepreneurship, there may be plenty of situations wherein policy entrepreneurs do all of these things but nonetheless do not achieve their aims (Arnold 2023). And if that is possible, it implies that the strategies we typically recommend pol-

icy entrepreneurs pursue might actually make no difference—that we observe them in successful and unsuccessful (or moderately successful) cases because it is really some other set of factors, like elite preferences or the dominant policy image, that have the real causal leverage over outcomes. Similarly, if we only study cases where policy entrepreneurs achieve adoption of the policy they champion—and fail to study cases where such a policy is adopted, even without a strong and committed advocate—then we cannot infer that policy entrepreneurship is a key driver.

This argument is not unique to my particular corner of the policy literature. It emerges whether we are studying cities, provinces, countries, organizations, businesses, or advocacy campaigns, across all sectors. For example, if our research shows that advocacy groups with extensive financial resources often achieve their aims, we have to ask whether there are also well-resourced advocacy groups that fail, suggesting that perhaps something about the issue or opponents actually matters as much or more than resources. If some children in foster care receive few visits from government social workers but are still as healthy and well-adjusted as children who receive many, then devoting public resources to boosting supervision might not be the best way to ensure quality livelihoods for vulnerable children.

When scholars examine negative cases, particularly using quantitative approaches, they need to think through and then evaluate the causal processes they expect to produce positive versus negative outcomes. Too often, we tend to assume that the relationships we find statistically significant in predicting positive outcomes of interest, like policy adoption or lobbying efficacy, also predict negative outcomes, just with a flipped sign: If having more financial resources appears to help an advocacy group capture attention, we assume that having fewer financial resources must make such a group less efficacious. If more home visits from social workers help improve health outcomes for foster children, we assume fewer home visits will be correlated with worse health outcomes, and so on. But we rarely actually test whether these phenomena are bidirectional, leaving open the possibility that the factors driving negative outcomes might be different than those driving positive ones. Lieberson (1985) discussed this problem some decades ago, but it is still recognized—and addressed—too infrequently. This is also an argument for pairing quantitative research that can identify patterns with qualitative research that can help explain patterns; in-depth case studies relying on expert informants may reveal differences in causal pathways between negative and positive cases.

China again offers a compelling context for evaluating and learning from negative cases. The country has a long tradition of encouraging local policy experiments so as to derive lessons from more and less successful efforts and, sometimes, incorporate these into national-level policy rollouts (Wang and Yang 2025). There are thus many opportunities, across many sectors,

types of policy, and type of administrative unit, to examine divergent outcomes and how these outcomes manifested. For example, Wei and coauthors (2025) examined how three county governments in China grappled with large COVID-19 outbreaks, exploring how variation in insight, integration, learning, and innovation capacity helps explain why counties had different levels of success in controlling the virus's spread. While there may be selection biases in terms of which local governments pursue policy experiments (Cai and Chen 2024), careful case selection by researchers can help mitigate this issue. Indeed, studying policy experimentation as a mode of governance, with China as a canonical case, can help scholars understand how heavily institutionalized political systems learn and adaptively manage (e.g., Han and Fu 2024). The Chinese context also offers an interesting opportunity to examine pathways to negative results in a less-democratic developing state, given that the already limited scholarship in this domain tends to focus on western developed countries. For example, research suggests that advocacy coalitions in China engage in less inter-coalitional policy learning than coalitions in western contexts (Li and Weible 2021). Accordingly, a researcher asking why an advocacy coalition in China fails to learn might posit that lack of learning results from lack of diversity (and thus limited informational resources) within a coalition rather than lack of engagement with an opposing coalition.

A critical first step in steering toward positive outcomes is understanding how we create them. This is my third and last point. My own country is enormously polarized right now, across a range of dimensions—political, ideological, economic, and cultural. Trying to bridge these divides is the challenge of our time. How do we talk to each other? How do we move beyond echo chambers and engage in genuine conversation about how we want our society to function and what we are willing to contribute to make that happen? As policy scientists, we're already pretty good at studying and diagnosing problems. Yet studying how people try to solve problems is even more important. How do people with different views nonetheless collaborate? How do people learn during the governance process, finding ways to improve public policies rather than doubling down on preexisting beliefs and screening out dissonant information? How do decision-makers engage the public meaningfully? How do we foster trust in government so that the public is willing to engage in decision-making?

Scholars of collaborative governance, deliberative democracy, and co-production are intimately familiar with these questions. From their work, we know, for example, that trust in government can encourage citizens to engage in co-production, and the converse (Liu et al. 2024). Collaborative governance mechanisms can increase representation of marginalized stakeholders in public decision-making (Dobbin and Lubell 2021). Deliberative institutions like citizen and assemblies and mini-publics can reduce polarization among participants (Fishkin et al.

2021). When citizens know that such institutions have been employed in public decision-making, they view the decisions as more legitimate, even when they themselves were not involved in the deliberation (Boulianne 2017). The particular value we as policy scholars can add to these literatures is examining the processes by which interventions to increase deliberation, collaboration, and stakeholder engagement and buy-in—phenomena that are often studied as experiments or trials, isolated from larger sociopolitical contexts (e.g., Gronland et al. 2023), or as tools or methods rather than governance modes (Lin 2025)—can be integrated and institutionalized into governance systems. Our expertise in studying the policy process, from agenda-setting to adoption to implementation, allows us to analyze how these innovations fare across diverse political venues and over time. We can inquire, for example, into the necessity of public mobilization or policy entrepreneurship for convincing government officials to integrate public participation more systematically into decision-making (Ravazzi 2017), how a public organization's governance culture affects the extent to which it institutionalizes participatory planning (Gollatta et al. 2021), or how traditional modes of bureaucratic policy implementation respond to bottom-up demands for collaborative change (Hofstad et al. 2024).

In this effort, the Chinese case again offers fruitful empirical grist as well as opens new avenues for scholarship. The aforementioned tradition in China of piloting policy innovations locally and adapting and adopting successful innovations at the national level provides opportunities for studying how policy innovations are scaled up and out and the challenges that must be met along the way. The complexity of multi-level governance in China allows scholars to examine the scales at which interventions can be most effective and how multiplex principal-agent relationships affect policy institutionalization. China also offers an empirical setting for studying important questions around how public participation, deliberation, and consensus-building can be incorporated into political systems not built on the western liberal model. In particular, an emerging literature is developing around how Confucian conceptualizations of democracy and political meritocracy can support the integration of public participation in Chinese public decision-making (Bitton 2022; Tong 2025; Li 2024). Interesting emerging empirical work in this area includes Cao's (2022) analysis of how grassroots engagement in urban governance in Nanjing buffers and even repairs disjunctures in policy goals and practices across hierarchical levels of government, and how appeals to social norms and encouragement by influential individuals and entities encourages citizen engagement in neighborhood renewal initiatives (Tang et al. 2022).

This brings us back to a human agency-centered perspective. The public choice theorist Vincent Ostrom—who made the first of multiple visits to China 1997 along with his wife and future Nobel Prize winner in Economics, Elinor Ostrom—often reminded us that

cities, countries, or organizations do not, on their own, do anything at all (V. Ostrom 1997). People do. People pursue goals, learn fallibly, seek to effectuate beliefs and values, build relationships, and lead and inspire others—and these individual choices are what aggregate to the policy outputs we attribute to governments or organizations (E. Ostrom 2005). As policy scholars interested in understanding and improving governance, we need to study the agentic choices that undergird it. We cannot shy away from studying negative cases where policy phenomena do not manifest as expect or interventions do not work as intended; this analysis is vital to gaining explanatory leverage over causal processes. And we must not just diagnose societal problems but investigate how humans work actually work together to solve them, and how people can institutionalize problem-solving into governance regimes. People are artisans and governance is their craft (V. Ostrom 1997; E. Ostrom 2005). Our challenges are vast. We are the only ones who can save us. And our job as policy scientists is to help support our communities as they collectively pursue the artisanship of governance.

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How Do Local Governments Collaborate Across Levels? An Evolutionary Game Theory Analysis of Policy Demonstrations in China

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Abstract

As a central institutional arrangement for promoting local policy innovation in China, policy demonstrations increasingly feature cross-level collaboration by central guidance. This process involves strategic interactions among provincial, municipal, and district governments rather than mere top-down implementation. However, the existing research has insufficiently examined how these cross-level interactions evolve dynamically. To address this literature gap, this study develops an evolutionary game model of provincial, municipal and district governments to analyze their strategic interactions and to identify evolutionarily stable strategy (ESS) under varying incentive and constraint conditions. Numerical simulations illustrate the emergence and evolution of collaborative dynamics. We further validate the model in the case study of City

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S and reveal the organizational mechanisms shaping collaborative policy demonstration. The findings suggest that provincial governments provide structural leadership, municipal governments function as coordination hubs, and district governments' cooperation is strongly shaped by grassroots feedback. Effective and sustainable cross-level collaboration hinges on positive incentives and institutionalized resource coordination. This research provides a dynamic theoretical lens for understanding the mechanism of cross-level collaboration in China's policy demonstrations and offers practical insights for the development of sustainable and robust policy innovation in local governments.

Keywords: Cross-Level Government Relations; Policy Demonstrations; Evolutionary Game Theory; Case Analysis

¿Cómo colaboran los gobiernos locales entre niveles? Un análisis de la teoría de juegos evolutiva de las demostraciones de políticas en China

Resumen

Como mecanismo institucional central para promover la innovación en políticas locales en China, la implementación de políticas se caracteriza cada vez más por la colaboración internivel bajo la dirección central. Este proceso implica interacciones estratégicas entre los gobiernos provinciales, municipales y distritales, en lugar de una mera implementación vertical. Sin embargo, la investigación existente no ha examinado suficientemente cómo estas interacciones interniveles evolucionan dinámicamente. Para abordar esta brecha bibliográfica, este estudio desarrolla un modelo de juego evolutivo de los gobiernos provinciales, municipales y distritales para analizar sus interacciones estratégicas e identificar la estrategia evolutivamente estable (ESS) bajo diversas condiciones de incentivos y restricciones. Las simulaciones numéricas ilustran el surgimiento y la evolución de la dinámica colaborativa. Validamos aún más el modelo en el caso de estudio de la Ciudad S y revelamos los mecanismos organizativos que configuran la implementación colaborativa de políticas. Los hallazgos sugieren que los gobiernos provinciales proporcionan liderazgo estructural, los gobiernos municipales funcionan como centros de coordinación y la cooperación de los gobiernos distritales está fuertemente influenciada por

la retroalimentación comunitaria. Una colaboración internivel eficaz y sostenible depende de incentivos positivos y de la coordinación institucionalizada de recursos. Esta investigación proporciona una perspectiva teórica dinámica para comprender el mecanismo de colaboración internivel en las demostraciones de políticas de China y ofrece perspectivas prácticas para el desarrollo de una innovación política sostenible y robusta en los gobiernos locales.

Palabras clave: Relaciones gubernamentales interniveles; Demostraciones de políticas; Teoría de juegos evolutiva; Análisis de casos

地方政府跨层级协作何以实现？——基于中国场景下政策示范创建的演化博弈分析

摘要

作为推动中国地方政策创新的重要制度安排，政策示范呈现出在中央统筹部署下的跨层级协作特征。在这一过程中，省、市、区三级政府之间的互动不再是简单的自上而下过程，而是体现出复杂的策略博弈关系。然而，现有研究尚未系统揭示跨层级政府在政策示范创建过程中的动态互动机制。为弥补这一研究空缺，本研究构建了一个包含省级、市级和区级政府的演化博弈模型，以刻画在不同激励与约束条件下各级政府的策略选择逻辑及其演化稳定策略（ESS），并通过数值仿真进一步揭示跨层级协作关系的生成机制与演化路径。在此基础上，本研究以S市为案例，对模型结论进行验证。研究发现，示范创建过程中，省级政府发挥结构性领导作用，市级政府承担协同枢纽功能，而区级政府的合作意愿则深受基层政策反馈的影响；一个有效且可持续的跨层级协作模式有赖于正向激励机制与制度化的资源协同安排。本研究为理解中国政策示范制度安排及其创建过程中的跨层级政府协作关系提供了动态性的理论分析视角，并为推动地方政府政策创新的可持续发展提供了实践启示。

关键词：跨层级府际关系；政策示范；演化博弈；案例分析

1. Introduction

As China enters a new stage of economic and social development, the pains of economic transformation—such as the scarcity of governance resources and the intensification of institutional pressure—will inevitably impact national politics and local governance. Against this backdrop, there is a growing imperative for governments to rely on policy innovation to address emerging social problems by providing effective policy arrangements and governance models.[3] Moreover, policy innovation serves as a critical means for enhancing the legitimacy and effectiveness of governance and for responding to rising expectations in social governance. Among the diverse strategic tools employed to advance local policy experimentation in China, policy experimentation has long stood as a central instrument of scholarly interest and practical application. It not only embodies China's gradualist approach to policy innovation but also creates institutional space for local governments to explore, adjust, and scale up effective policy solutions.[4] Its core advantage lies in improving the scientific rationality of public policy while mitigating the risks associated with policy failure. At the operational level, pilot-based experimentation allows governments to identify policy issues on a limited scale, make incremental strategy adjustments, and optimize policy design on the basis of trial outcomes—thereby avoiding implementation difficulties that may arise from blanket, one-size-fits-all approaches. In driving local policy innovation through experimentation, intergovernmental relations play a crucial role and constitute a key analytical dimension. The existing research on this issue is relatively rich and can be broadly categorized into three perspectives: strong control by higher-level governments, full autonomy of lower-level governments, and collaborative relationships between superior and subordinate governments. These three relational models not only reflect the central–local power dynamics within China's political system but also directly influence how policy experiments are conducted and how effective they are.

Studies from the perspective of strong control by higher-level governments argue that, during the process of policy experimentation, upper-level authorities—leveraging their organizational authority—often occupy a dominant position, exercising tight supervision and control over local experimenters.[5] In this context, local governments function primarily as implementers, with limited discretion to make only minor adjustments to policy schemes within the boundaries of

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4 Heilmann, S. (2008). Policy experimentation in China's economic rise. *Studies in comparative international development*, *43*(1), 1-26.

5 Callander, S., & Hummel, P. (2014). Preemptive policy experimentation. *Econometrica*, *82*(4), 1509-1528.

existing frameworks.[6] In other words, higher-level governments may set the objectives, content, and scope of experiments through administrative orders or legal regulations while closely monitoring and evaluating the entire process to ensure alignment with national political will. This top-down mode of intergovernmental relations reduces the political risks and uncertainty associated with experimentation, but it also curtails local autonomy, often leading to policy misalignment with local conditions. Conversely, studies emphasizing the full autonomy of lower-level governments suggest that local governments take on a leading role in policy experimentation, enjoying considerable decision-making authority and flexibility.[7] While higher-level governments may provide general policy directions or frameworks, local governments are empowered to independently design and implement policy experiments tailored to local contexts. This model is commonly observed in China's special economic zones and pilot innovation districts. Under this approach, policy innovation is typically driven by external pressures and urgent reform imperatives. A classic example is the household responsibility system reforms initiated in provinces such as Anhui and Sichuan during the early years of China's reform and opening-up.[8] With high levels of local discretion, policy experiments tend to better reflect local realities and are more likely to mobilize social innovation and grassroots creativity, thus increasing the likelihood of success.

However, the absence of political support from higher-level governments can undermine the sustainability of such experiments. More critically, in a unitary political system such as China's, if experiments deviate from the accepted political framework, they can be subject to political manipulation or suppression.[9] A third line of research places greater emphasis on collaborative and interactive relationships between superior and subordinate governments in policy experimentation. It argues that through mechanisms such as negotiation, resource sharing, and benefit distribution, cross-level government actors can jointly promote the implementation of experiments. From this perspective, successful experimentation depends heavily on dialog and coordination.[10] Proponents of this model describe it as one where "the upper level sets the general framework, while the lower level explores concrete pathways," thus ensuring both normative policy guidance and sufficient room

6 Heffer, A. S., & Schubert, G. (2023). Policy experimentation under pressure in contemporary China. *The China Quarterly*, *253*, 35-56.

7 Heilmann, S. (2008). From local experiments to national policy: the origins of China's distinctive policy process. *The China Journal*, (59), 1-30.

8 Lin, J. Y. (1987). The household responsibility system reform in China: a peasant's institutional choice. *American Journal of Agricultural Economics*, *69*(2), 410-415.

9 Zeng, J. (2015). Did policy experimentation in China always seek efficiency? A case study of Wenzhou financial reform in 2012. *Journal of Contemporary China*, *24*(92), 338-356.

10 Mattocks, K. (2025). What is successful policy experimentation? *Policy & Politics*, 1-22.

for local innovation. In this model, the central government provides only principled policy frameworks and essential resource support, while local governments engage in creative exploration within those parameters.[11] However, such intergovernmental collaboration places high demands on the inclusiveness and flexibility of the political system, as well as on the governance capacities and competencies of the participating government actors.

In recent years, within the context of China's policy practices, policy demonstration zones have emerged as a distinct form of experimentation that differs from more locally autonomous pilot programs, reflecting a closer and more coordinated relationship among different levels of government in the policy experimentation process. Chinese scholars have increasingly regarded policy demonstration as a unique policy experimentation tool, distinguishing it from traditional policy pilots.[12] This line of research emphasizes that policy demonstration not only involves localized exploration of specific policies but also highlights the integration of the mobilizing and directive role of higher-level governments with the exploratory and adaptive role of lower-level governments in jointly driving social transformation.[13] Under this mechanism, provincial, municipal, and district governments bear differentiated policy responsibilities, yet they must also jointly engage in problem diagnosis, resource coordination, and experimental implementation. The process is not static. Rather, it involves continuous strategic adjustments in response to administrative incentives, intergovernmental expectations, and feedback from policy performance. Accordingly, this study focuses on the dynamic strategic interactions that emerge within this cross-level governance structure. The central research question of this paper is as follows:

How do provincial, municipal, and district governments adjust their strategies in the process of advancing centrally advocated policy demonstrations, and under what conditions can a stable and sustainable collaborative relationship be established across levels of government?

However, a review of the existing literature reveals several limitations. While current studies contribute to the conceptual understanding of policy demonstration and provide some insights into cross-level collaborative policy experimentation, they have yet to thoroughly explore the intergovernmental coordination mechanisms from the perspective of game theory—especially evolutionary game theory. Moreover, the existing research has focused predominantly on collaboration between central and provincial governments, overlooking the reality that, in

11 Wang, G. (2019). Principle-guided policy experimentation in China: From rural tax and fee reform to hu and wen's abolition of agricultural tax. *The China Quarterly*, *237*, 38-57.

12 Min, Y., & Wan Sheng, Wan. (2013).Explanation：A Key Mechanism of Chinese—Style Policy Implementation. *Journal of Public Management,10*(4),15-25.

13 Min, Y., Chang Jun Chen, & Liang, Z. (2023).Model Construction: A Controlled Mobilization Mechanism in Policy Implementation. *CASS Journal of Political Science* (3),46-59.

local policy experimentation, provincial, municipal, and district-level governments are often the primary actors involved. Additionally, prior studies have not adequately accounted for the influence of participation probabilities or willingness on the strategic choices made by each actor, leaving the understanding of the dynamic evolutionary mechanisms of policy experimentation incomplete.

This study incorporates provincial, municipal, and district governments as key actors in a cross-level collaborative policy experimentation framework and constructs a tripartite evolutionary game model on the basis of their respective participation probabilities. The model is used to derive evolutionarily stable strategies under different conditions. Furthermore, the model's implications are validated through numerical simulation and a case-based analysis.

2. Evolutionary Game Analysis Process

2.1 Model Background

In this study, evolutionary game theory is employed as the analytical framework. In fact, evolutionary game theory offers a particularly suitable and effective framework for analyzing the dynamic relationships among organizational actors. The decision to adopt an evolutionary game-theoretic framework is rooted in the dynamic and adaptive nature of cross-level collaborative policy experimentation in China. Unlike static models that assume fully rational actors making one-off optimization decisions, cross-level collaboration among provincial, municipal, and district governments unfolds as a continuous process of strategic adjustment. Government actors learn from policy feedback, respond to administrative pressures, and modify their strategies over time, reflecting bounded rationality and path-dependent adaptation rather than instantaneous equilibrium optimization. Evolutionary game theory is therefore particularly well suited to this research context. By specifying payoff functions and applying replicator dynamics, the model captures how the willingness of each level of government to participate in collaborative experimentation evolves as relative payoffs change. Furthermore, the identification of equilibrium points and their stability properties, including evolutionarily stable strategies (ESS), allows us to determine which modes of collaboration are likely to be self-sustaining, which are conditionally stable, and which are inherently fragile or prone to breakdown without external intervention. Importantly, this approach complements the case study analysis rather than substituting for it. While the case study provides empirical grounding and contextual specificity, the evolutionary game model offers a mechanism-based theoretical explanation for the observed interaction patterns. In other words, the model does not merely describe how cross-level collaboration occurs but clarifies why certain cooperation arrangements emerge, how they stabilize, and under what conditions they may fail. This integration of formal model-

ing and empirical evidence enhances both the internal validity and the theoretical contribution of the study.

In China, the advancement of policy experimentation relies on the active participation of local governments at multiple levels, primarily provincial governments (hereafter referred to as "provincial governments"), prefecture-level municipal governments (hereafter referred to as "municipal governments"), and district- or district-level governments (hereafter referred to as "district governments"). In the process of using policy experimentation to promote local policy innovation, these governmental tiers fulfill distinct roles in the division of experimental tasks, forming a complex system of collaboration. The provincial government, as the principal initiator of policy experiments, is mainly responsible for overall planning and for ensuring the smooth implementation of experiments through incentive and constraint mechanisms. The municipal government serves as an intermediary coordinator, bridging the upper and lower levels; it is tasked with implementing the guiding principles of the provincial government while adapting policies to local conditions. The district government, as the primary executor, is responsible for the on-the-ground implementation of policy experiments, the outcomes of which are subject to direct evaluation by the local population.

Ideally, intergovernmental cooperation is supported by a "benefit-sharing and cost-sharing" mechanism.[14] Under this arrangement, the gains from policy experimentation are not exclusive to a single level of government but are instead jointly shared among all involved parties. In particular, during the initial stage of experimentation, municipal and district governments often establish an informal contractual relationship around the experimental tasks, supported by a mutual "performance bond," to enhance the credibility and enforcement of the agreement. Additionally, the provincial government is expected to conduct periodic evaluations of policy experimentation performance at lower levels and adjust subsequent funding allocations on the basis of the assessment results.

The above depiction reflects the idealized division of responsibilities and relational dynamics among different levels of government in policy experimentation. In practice, however, the cross-level collaborative relationships among government actors are far more complex. In essence, the provincial government must decide whether to engage in cross-level policy experimentation, while the municipal and district governments must determine whether and how to collaborate during the process. On the basis of this logic, this study draws on the evolutionary game model developed by Wu Jie and colleagues and extends it by constructing a tripartite evolutionary game model involving provincial, municipal, and district governments.[15]

14 Zhu, X., & Wang, Y. (2024). Policy experimentation as communication with the public: Social policy, shared responsibility and regime support in China. *The China Quarterly*, *258*, 400-422.

15 Wu, J., Che XJ, & Sheng YX et al. (2019). Study on Government-industry-university-institute Col-

2.2 Basic Assumptions of the Model

We first need to introduce several basic concepts involved in evolutionary game analyses. In this study, we draw on several core concepts from evolutionary game theory to examine the strategic interactions among provincial, municipal, and district governments in cross-level policy experimentation. The payoff function captures the benefits and costs associated with each actor under different strategy combinations, serving as both the determinant of strategy selection and the foundation for dynamic analysis. On the basis of these payoffs, replicator dynamics describe how strategies evolve over time: strategies yielding above-average payoffs tend to increase in prevalence, whereas less advantageous strategies diminish, enabling a dynamic representation of actors' evolving willingness to participate. An equilibrium point denotes a state in which strategy distributions stabilize, reflecting potential long-term outcomes and providing a basis for evaluating the robustness of cooperative arrangements. To assess the stability of these equilibria, we employ the Jacobian matrix and examine its eigenvalues: negative eigenvalues indicate that small perturbations decay and the system returns to equilibrium, whereas positive eigenvalues signal that deviations amplify, distinguishing stable equilibria, conditionally stable saddle points, and unstable equilibria. An ESS is one that cannot be invaded by a small fraction of deviating actors, representing a robust and sustainable pattern of cooperation. Saddle points are stable along certain dimensions but unstable along others, highlighting cooperation that persists only under specific conditions, while unstable equilibria indicate strategy configurations that cannot be maintained without external intervention or adjustments to payoffs or incentives. Collectively, these concepts provide a rigorous framework for understanding how actors adapt their strategies in response to both individual payoffs and external incentives and identify which cross-level cooperation patterns are likely to be durable, which are conditionally stable, and which require policy support to sustain, offering both theoretical insights and practical guidance for designing effective collaborative policy experiments.

To scientifically construct the game model and clearly articulate the strategies of each actor, the possible equilibrium states, and the logical relationships among various factors, this study proposes the following assumptions on the basis of evolutionary game theory:

(1) Participating Actors: In the game involving tripartite government collaboration in policy experimentation, there are three types of actors: the provincial government (G), the municipal government (S), and the district government (E). The provincial government primarily facilitates effective collaboration between municipal and district governments by offering various incentives and supervising their

laborative Innovation Based on Tripartite Evolutionary Game. *Chinese Journal of Management Science, 27*(01), 162-173.

collaborative experimentation processes. The district government focuses on transforming acquired experimental knowledge and resources into concrete policy innovations, while the municipal government plays a critical intermediary role by providing the necessary policy expertise and resource support. All three actors are assumed to have bounded rationality and adjust their strategies through repeated games to seek optimal outcomes.

(2) Cooperation Strategies: During the collaborative policy experimentation process, the provincial government can choose to either participate (by offering preferential policies and supervising the process) or not participate (leaving municipal and district governments to conduct experiments independently); thus, its strategy set is (participate, not participate). Both the municipal and district governments can choose to cooperate with one another in conducting policy experiments or not cooperate; their strategy sets are (cooperate, not cooperate).

(3) Cooperation Costs: Although the provincial government does not directly engage in the experimentation itself, it incurs a cost G_1 when providing preferential policies and conducting oversight. As the primary actors, the municipal and district governments must invest labor, materials, and financial resources, incurring a total cost C. If the provincial government chooses to participate, the preferential policies it provides reduce the total experimentation cost by an amount denoted as S, making the adjusted cost $C - S$. Let t represent the cost-sharing coefficient between the district and municipal governments. Then, the district government bears a cost of tC or $t\,(C - S)$, and the municipal government bears $(1 - t)C$ or $(1 - t)\,(C - S)$.

(4) Cooperation Benefits: Let R_1 represent the benefit obtained by the provincial government when it chooses to participate. If it chooses not to participate, it still receives partial benefit, denoted as bR_1, where $b \in (0,1)$ represents the proportion of benefit relative to full participation. Let R_2 and R_3 denote the baseline benefits received by the district and municipal governments, respectively, from engaging in collaborative experimentation. When both governments choose to cooperate, an additional benefit R is generated, shared according to the coefficient a: the district government receives aR, and the municipal government receives $(1 - a)R$. If only one side chooses to cooperate, asymmetric outcomes arise. When the municipal government cooperates but the district government does not, the district government independently conducts the experiment and receives a reduced benefit L_1. Conversely, when the district government cooperates but the municipal government does not, the municipal government receives a reduced benefit L_2. Furthermore, the provincial government provides an additional financial incentive G_2 to municipal governments that actively participate in collaboration.

(5) Penalties: To prevent a breach of cooperation under provincial government supervision, a penalty mechanism is established. If the district government chooses to cooperate but

the municipal government does not, the municipal government must compensate the district government with a penalty amount W. Conversely, if the municipal government cooperates but the district government defects, the district government must pay a penalty K to the municipal government.

2.3 Presentation of the Payoff Matrix

In the model, the provincial, municipal, and district governments each choose their strategies on the basis of their respective preferences. Let x denote the probability that the provincial government chooses to participate in the collaborative experiment such that the probability of nonparticipation is $1 - x$; let y denote the probability that the district government chooses to cooperate, with $1 - y$ representing the probability of noncooperation; and let z denote the probability that the municipal government chooses to cooperate, with $1 - z$ representing the probability of noncooperation. Here, x, y, z ∈ (0,1).

On the basis of the five assumptions outlined above, the payoff matrices for the tripartite "province–municipality–district" collaborative experimentation game are presented in Tables 1 and 2. In these matrices, the district government's participation constraint is reflected in the penalty W paid when it breaches cooperation, and its incentive constraint is captured by the benefit-sharing coefficient a when it participates. Similarly, the municipal government's participation constraint is represented by the penalty K paid when it breaches cooperation, while its incentive constraint is reflected in the benefit-sharing coefficient $1 - a$ when it participates in the collaborative experiment.

Table 1. Payoff Matrix of the Intergovernmental Collaborative Experimentation Game with Provincial Government Participation

		Municipal Government	
		Cooperate (z)	Not Cooperate ($1 - z$)
district Government	Cooperate (y)	$R_1 - G_1 - G_2$ $R_2 + aR - t(C - S)$ $R_3 + (1 - a)R - (1 - t)(C - S) + G_2$	$R_1 - G_1$ $R_2 - t(C - S) + W$ $R_3 - W + L_2$
	Not Cooperate ($1 - y$)	$R_1 - G_1 - G_2$ $R_2 + L_1 - K$ $R_3 - (1 - t)(C - S) + K + G_2$	$R_1 - G_1$ R_2 R_3

Table 2. Payoff Matrix of the Intergovernmental Collaborative Experimentation Game without Provincial Government Participation

		Municipal Government	
		Cooperate (z)	Not Cooperate ($1 - z$)
district Government	Cooperate (y)	bR_1 $R_2 + aR - tC$ $R_3 + (1 - a)R - (1 - t)C$	bR_1 $R_2 - tC + W$ $R_3 - W + L_2$
	Not Cooperate ($1 - y$)	bR_1 $R_2 + L_1 - K$ $R_3 - (1 - t)(C - S) + K + G_2$	$R_1 - G_1$ R_2 R_3

2.4 Stability Analysis of Equilibrium Points

The process for deriving the evolutionarily stable strategy (ESS) is provided in Appendix. By performing calculations in MATLAB, the eigenvalues of the Jacobian matrix corresponding to each equilibrium point are obtained, as shown in Table 3.

Table 3. Eigenvalues of the Jacobian Matrix

Equilibrium Points	Eigenvalue α_1	Eigenvalue α_2	Eigenvalue α_3
$E_1(0,0,0)$	$1-b(R_1-G_1)$	$-tC-W$	$-(1-t)C+K$
$E_2(0,0,1)$	$(1-b)R_1-G_1-G_2$	$aR+K-L_1-tC$	$-[-(1-t)C+K]$
$E_3(0,1,0)$	$(1-b)R_1-G_1$	$-(-tC+W)$	$(1-a)R+W-L_2-(1-t)C$
$E_4(0,1,1)$	$(1-b)R_1-G_1-G_2$	$-(aR+K-L_1-tC)$	$-[(1-a)R+W-L_2-(1-t)C]$
$E_5(1,0,0)$	$-[(1-b)R_1-G_1]$	$-t(C-S)+W$	$G_2-(1-t)(C-S)+K$
$E_6(1,0,1)$	$-[(1-b)R_1-G_1-G_2]$	$aR+K-L_1-t(C-S)$	$-[G_2-(1-t)(C-S)+K]$
$E_7(1,1,0)$	$-[(1-b)R_1-G_1]$	$-[W-t(C-S)]$	$(1-a)R+W-L_2+G_2-(1-t)(C-S)$
$E_8(1,1,1)$	$-[(1-b)R_1-G_1-G_2$	$-[aR+K-L_1-t(C-S)]$	$-[(1-a)R+W-L_2+G_2-(1-t)(C-S)]$

To simplify the analysis of the signs of the eigenvalues and ensure consistency with realistic policy contexts, the following assumptions are made:

$$(1-b)R_1-G_1-G_2>0\ ;\quad aR+K-L_1-tC>0\ ;\quad (1-a)R+W-L_2-(1-t)C>0$$

These conditions imply that the net benefit of engaging in collaborative policy experimentation by the provincial, municipal, and district governments is greater than the net benefit of pursuing experimentation independently. The analysis proceeds by considering the following scenarios:

Case 1: When

$G_2+K-(1-t)(C-S)<0; W-t(C-S)<0,$

this indicates that the sum of the penalty paid by the district government to the municipal government and the benefit provided by the provincial government to the municipal government is less than the municipal government's cost of participating in the collaborative experiment when the provincial government is involved; simultaneously, the penalty paid by the district government when acting unilaterally is less than the cost incurred by the municipal government when it is collaborating under provincial supervision. Under these conditions, as shown in Table 4, the eigenvalues of the Jacobian matrices corresponding to equilibrium points $E_5(1,0,0)$ and $E_8(1,1,1)$ are nonpositive, indicating that both are stable equilibrium points. The corresponding evolutionary strategies are (participate, not cooperate, not cooperate) and (participate, cooperate, cooperate).

Case 2: When

$K-(1-t)C>0$ or $(W-tC)>0$,

the penalty paid by the district government when it acts unilaterally is greater than the municipal government's cost of cooperation when the provincial government is not involved; otherwise, the penalty paid by the municipal government is greater than the district government's cost of cooperation under the same conditions. In this case, as shown in Table 4, the eigenvalues of the Jacobian matrix at $E_8(1,1,1)$ are nonnegative, implying that the system has a unique stable equilibrium point at E_8, with the corresponding strategy being (participate, cooperate, cooperate).

Case 3: When

$G_2+K-(1-t)(C-S)>0$and $K(1-t)C<0$ *or* $W-t(C-S)>0$, or when $W-t(C-S)>0$ and $W-tC<0$,

this reflects a situation in which the combined penalty and benefit received by the municipal government exceeds its cost of cooperation when the provincial government is involved and the penalty for noncooperation is less than the cost under nonparticipation; otherwise, the penalty paid by the municipal government is greater than the cost borne by the district government under provincial participation but still less than the cost under nonparticipation. In this case, as shown in Table 4, the eigenvalues of the Jacobian matrix at equilibrium point $E_8(1,1,1)$ are nonpositive, suggesting that E_8 is a stable equilibrium point. The corresponding evolutionary strategy is as follows: (participate, cooperate, cooperate).

Table 4. Properties of the Eigenvalues at Equilibrium Points under Different Conditions

Equilibrium Points	Case 1				Case 2				Case 3			
	α_1	α_2	α_3	Stability	α_1	α_2	α_3	Stability	α_1	α_2	α_3	Stability
$E_1(0,0,0)$	+	−	+, −	Unstable equilibrium point	+	+	+	Saddle point	+			Unstable equilibrium point
$E_2(0,0,1)$	+	+	+, −	Saddle point	+	+	−	Unstable equilibrium point	+	+	+	Saddle point
$E_3(0,1,0)$	+	+	+	Saddle point	+	−	+	Unstable equilibrium point	+	+	+	Saddle point
$E_4(0,1,1)$	+	−	−	Unstable equilibrium point	+	−	−	Unstable equilibrium point	+	−	−	Unstable equilibrium point
$E_5(1,0,0)$	−	−	−	ESS	−	+	+	Unstable equilibrium point	−	+	+	Unstable equilibrium point

(Cont'd.)

Equilibrium Points	Case 1				Case 2				Case 3			
	α_1	α_2	α_3	Stability	α_1	α_2	α_3	Stability	α_1	α_2	α_3	Stability
$E_6(1,0,1)$	−	+	+	Unstable equilibrium point	−	+	−	Unstable equilibrium point	−	+	−	Unstable equilibrium point
$E_7(1,1,0)$	−	+	+	Unstable equilibrium point	−	−	+	Unstable equilibrium point	−	−	+	Unstable equilibrium point
$E_8(1,1,1)$	−	−	−	ESS	−	−	−	ESS	−	−	−	ESS

3. Case Observation

After the stability analysis of the equilibrium points is complete, it is generally necessary to conduct numerical simulations for two primary purposes. First, simulations serve to validate the correctness of the theoretical analysis. Stability analysis typically relies on mathematical derivations, which often fail to capture the global dynamic properties of the system. Through simulation, one can visually assess the convergence and volatility of equilibrium points, thereby confirming the reliability of the theoretical deductions. Second, while theoretical analysis usually yields conclusions about stability, it does not demonstrate how the system evolves toward equilibrium. Simulations help illustrate the long-term evolutionary trajectories of the system.

3.1 Simulation Analysis

In this section, we conduct simulations on the basis of empirical insights drawn from one of the authors' field investigations in Province H, which is located in central China. These simulations are grounded in real-world policy experimentation and aim to further explore questions not fully addressed in the theoretical analysis.

In December 2013, six ministries of the Chinese central government—including the National Development and Reform Commission, Ministry of Finance, Ministry of Land and Resources, Ministry of Water Resources, Ministry of Agriculture and Rural Affairs, and the National Forestry and Grassland Administration—jointly issued the *Notice on the Pilot Implementation of National Ecological Civilization Demonstration Zones*, officially launching the construction of such zones. This initiative was a key step in implementing the *State Council's Opinion on Accelerating the Development of Energy Conservation and Environmental Protection Industries*, which called for the selection of 100 representative regions across the country to undertake ecological demonstration zone pilots.

City S of Province H was successfully included in the first batch of 100 National Ecological Civilization Demonstration Zones. Through this selection, the city launched a policy experimentation process centered on ecological governance. In the course of implementation, close cooperation was required among the provincial government (Province H), the municipal government (City S), and the district government under City S (District T).

Specifically, Province H was expected to prioritize this policy experiment in its governance agenda and support City S by providing preferential policies and special funding allocations, thereby reducing intergovernmental transaction costs and facilitating collaborative policy experimentation. As of now, City S has achieved notable progress and received multiple honors for its demonstration efforts. For instance, in 2019—the year of mid-term central evaluation—City S was named a member of the third batch of *National Ecological Civilization Demonstration Cities* by the Ministry of Ecology and Environment.

During the joint experimentation between City S and District T, the two parties formed an informal contractual relationship, under which failure by either party to fulfill its commitments would result in the payment of a breach penalty to the other.

On the basis of the actual case of City S, the initial parameter settings for the simulation are assumed as follows:

- Province H's payoff from participating: $R_1 = 40$
- Cost of formulating preferential policies and supervision by Province H: $G_1 = 5$
- Cost reduction from Province H's participation: $S = 8$
- Financial support from Province H to City S: $G_2 = 8$
- Benefit ratio when Province H does not participate: $b = 0.5$
- Total cooperation cost between City S and District T: $C = 45$, cost-sharing ratio $t = 0.5$
- Additional benefit from cooperation: $R = 100$, benefit-sharing ratio $a = 0.5$
- Independent experimentation payoffs: $L_1 = 25$ (District T), $L_2 = 30$ (City S)
- Penalties for breach: $K = 5$, $W = 5$
- Initial cooperation probabilities: 0.5 for Province H, City S, and District T

On the basis of these parameter values, this section uses MATLAB to simulate the dynamic evolutionary paths of strategy selection among Province H, City S, and District T under different initial conditions. The simulation further explores how variations in actors' initial willingness to participate, the preferential policies provided by the provincial government, the severity of penalties, and the benefit distribution coefficients affect system outcomes.

Figure 1 shows the simulation of how the initial probabilities of participation in the collaborative experiment by Province H, City S, and District T affect the strategy choices of each actor in the collaborative policy experiment under three different initial values: $x = 0.5$, $y = 0.5$, $z = 0.5$; $x = 0.4$, $y = 0.4$, $z = 0.4$; and $x = 0.6$, $y = 0.6$, $z = 0.6$, while all the other parameters remain unchanged.

The three-dimensional simulation graphs are generated using the plot3 function in MATLAB.

- The red dashed line represents the first set of initial conditions;
- The blue circular line represents the second set;
- The magenta cross-marked line represents the third set.

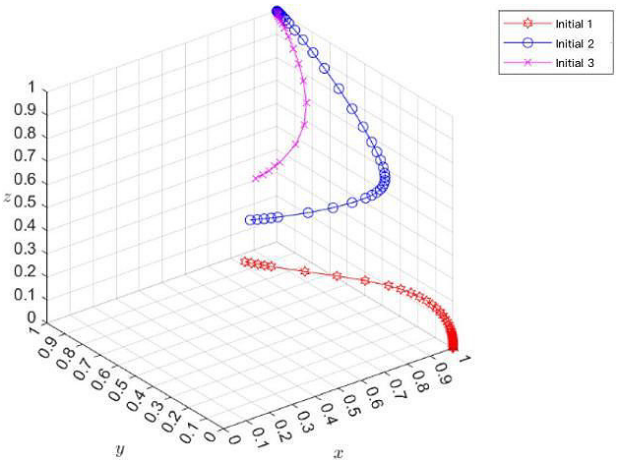

Figure 1. 3D Simulation Plot.

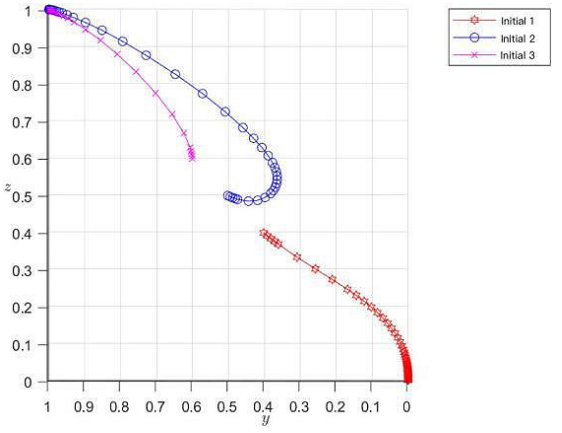

Figure 2. Simulation Plot on the y – z Relationship Plane.

Figures 2, 3, and 4 illustrate the two-dimensional projection planes showing interactions between each pair of actors.

Assuming that Province H, City S, and District T share the same initial participation probability, Figure 1 shows that the system's initial values range between 0.4 and 0.6. When the initial participation probability falls below a critical threshold, the system converges to the equilibrium point (1, 0, 0).

By switching to the y–z plane projection (Figure 2), it becomes evident that District T converges to the equilibrium point faster than City S does, indicating a more rapid shift in strategic behavior at the district level.

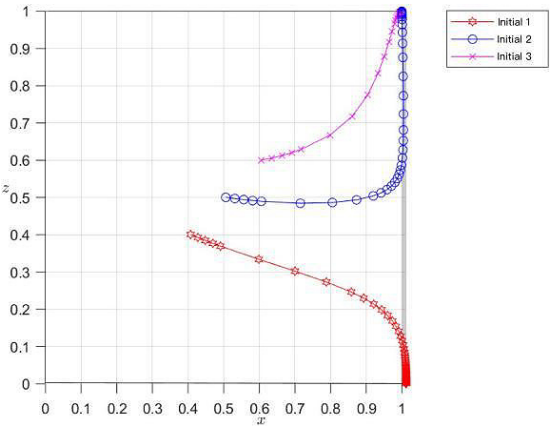

Figure 3. Simulation Plot on the x–z Relationship Plane.

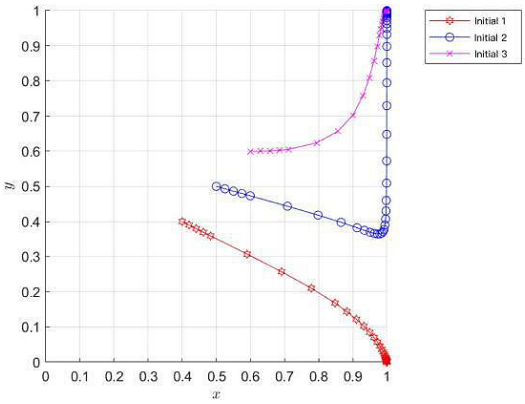

Figure 4. Simulation Plot on the x–y Relationship Plane.

When the initial participation probability exceeds the critical threshold, the system converges to the equilibrium point (1, 1, 1). When the initial participation probabilities of all three actors fall within a moderate range, the participation probability of Province H tends to increase significantly, while City S's participation increases at a relatively slower pace, and District T's willingness to participate initially declines. However, as the participation probabilities of the province and municipality increase, District T's participation also gradually increases.

Notably, when Province H fully commits to participating in the policy experiment, the willingness of both City S and District T to engage sharply increases. When all three actors demonstrate high initial participation probabilities, the system consistently converges to the collaborative equilibrium (1, 1, 1).

The simulation results indicate that as the overall participation probabilities increase:

- The convergence of x toward 1 slows down,

- The convergence of y and z toward 1 accelerates.

Ultimately, all three actors tend to adopt highly collaborative strategies when they participate in the policy experiment.

This pattern suggests that, in collaborative intergovernmental policy experimentation, when the municipal and district governments initially exhibit low willingness to participate, Province H tends to step in more assertively, assuming a leadership role and actively guiding and facilitating coordination among all parties to ensure effective implementation of the experiment.

Figures 5, 6, and 7 illustrate how changes in the initial participation probability of one actor affect the strategy evolution of the other two under different starting conditions.

When x (Province H) is below the intermediate threshold, both y (District T) and z (City S) eventually converge to 0. In this case, increases in x slow the rate at which y and z converge to 0, with z converging more slowly than y does. Conversely, when x exceeds the critical value, both y and z converge to 1, and higher values of x accelerate their convergence. In this case, z converges faster than y does. The simulation results indicate that increasing Province H's initial participation can effectively stimulate the willingness of City S and District T to cooperate, with City S being more responsive than District T is.

This suggests that in China's top-down administrative hierarchy, provincial governments typically do not directly allocate resources such as funding to district-level governments; instead, these resources are distributed via municipal governments. This governance arrangement makes the municipal government's willingness to cooperate highly dependent on the provincial government's position. In contrast, district governments—which are more directly connected to grassroots constituents—are more likely to be influenced by the needs and expectations of policy recipients. Therefore, in the absence of strong support from higher-level governments, District T's willingness to cooperate will also decline if both Province H and City S are hesitant to engage in cross-level collaboration.

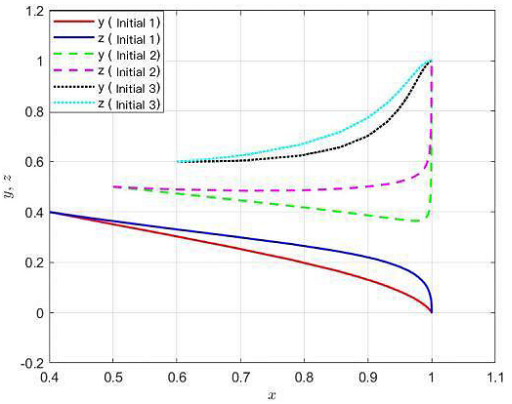

Figure 5. Simulation of the Effects of Province H's Initial Participation Probability.

Figure 6 presents the simulation of how changes in y affect x and z. When y is below the intermediate value—especially as it approaches 0—x gradually increases toward 1, while z decreases toward 0. When y exceeds the threshold, all three variables—x, y, and z—converge to 1. Moreover, increases in y significantly accelerate z's convergence, and z converges faster than x does.

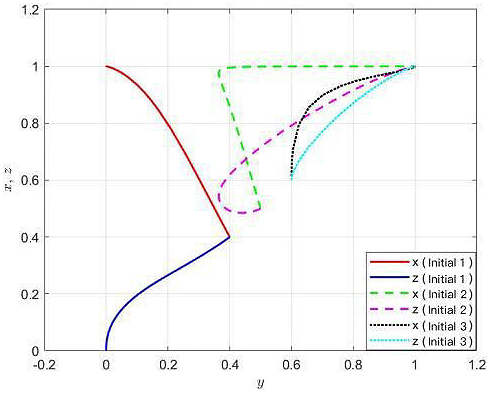

Figure 6. Simulation of the Effects of District T's Participation.

Figure 7 shows the influence of changes in z on x and y When z is low—especially near 0—x tends to increase toward 1, whereas y decreases toward 0. As z increases beyond the intermediate level, both x and y increase as well, and y converges faster than x does. This suggests that as City S's initial willingness to cooperate increases, District T's cooperation tends to strengthen, whereas Province H's cooperation increases more slowly. Ultimately, however, all three actors converge toward collaboration.

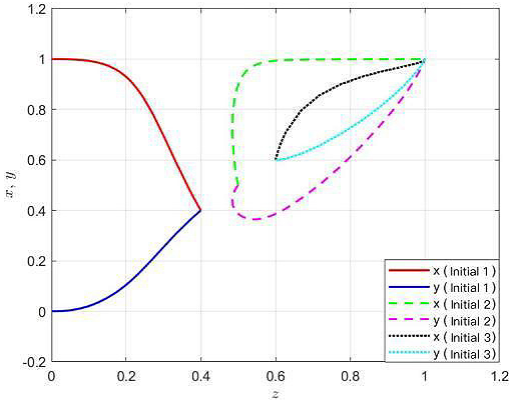

Figure 7. Simulation of the Effects of City S's Participation.

The simulation results demonstrate that increases in either District T's or City S's initial willingness to cooperate positively affect the other's propensity to participate, ultimately leading all the parties to adopt collaborative

strategies in policy experimentation.

This is consistent with empirical observations from the policy experimentation process in City S, one of China's designated National Ecological Civilization Demonstration Zones. As the central hub of governance resources, City S bears the primary responsibility for local policy experimentation. When District T displays a strong willingness to collaborate, City S also becomes more inclined to engage in collaboration to more efficiently allocate and apply the resources it controls.

On the basis of the replicator dynamics and stability analysis of the equilibrium points, this study yields several core findings regarding the mechanisms of cross-level collaborative policy experimentation:

First, *the participation behaviors of the three governmental actors exhibit path dependence and sensitivity to initial conditions*: When all the actors begin with low initial participation probabilities, the system converges to the equilibrium (1, 0, 0), in which only the provincial government remains engaged while the municipal and district governments choose not to cooperate. When the initial probabilities are high, the system converges to the full-cooperation equilibrium (1, 1, 1). When initial probabilities are moderate, the provincial participation tendency increases first, the municipal government follows more gradually, and the district government demonstrates a delayed and initially declining cooperative response. These findings indicate that differences in perceived benefits, policy pressure, and behavioral adjustment speed across levels produce stage-based evolutionary patterns in collaborative governance.

Second, *the provincial government plays a structurally dominant leadership role*: Higher levels of provincial participation reshape the payoff functions of the municipal and district governments through policy incentives and resource coordination, accelerating convergence toward the cooperative equilibrium (1, 1, 1). Thus, the province functions not only as the initiator of the policy experiment but also as the source of incentives and stabilizer of cross-level collaboration, directly influencing whether cooperation becomes sustained and institutionalized.

Third, *the municipal government serves as a critical transmission and amplification node in the collaborative structure*: The municipal government is more responsive to the strategic signals of the provincial government and exerts a stronger influence on the district government than vice versa. Changes in the district government's strategy exert relatively limited feedback effects on the municipality, whereas increases in the level of municipal cooperation significantly increase the district government's willingness to cooperate. This dynamic reflects a top-down diffusion mechanism in which experimental momentum flows from the provincial to the municipal to district levels.

Fourth, *positive incentives outperform punitive measures*: Incentive policies at the provincial level effectively increase participation probabilities among both municipal and district gov-

ernments, whereas punishment-based constraints between municipal and district governments promote cooperation only temporarily and with weaker effects. This suggests that compared with reliance on horizontal sanction-based mechanisms, vertical, incentive-based coordination is more conducive to stable collaborative experimentation.

3.2 Case Verification

To play a pivotal role in China's national ecological civilization construction, City S in Province H was included in the first batch of National Ecological Civilization Demonstration Zones. During this policy experimentation process, close cooperation among the provincial, municipal, and district governments was required to reduce the cost of policy innovation and improve coordination efficiency. This case study analyzes City S's policy experimentation to assess the real-world applicability of the simulation model and explore issues not fully addressed by the simulation analysis.

Ambiguity in vertical intergovernmental relations is likely to give rise to conflict.[16] At the initial stage of the demonstration zone initiative, Province H, City S, and District T had differing levels of willingness to participate and adopted different collaboration strategies. While Province H officially supported the policy experiment, its commitment was limited. Local governments had long prioritized GDP growth, and extensive development models still dominated. The pressure of economic restructuring further constrained governance resources, leading the provincial government to adopt a wait-and-see attitude toward the policy demonstration.

City S, as the designated demonstration zone, was motivated to pursue the policy initiative but faced resource constraints and sought stronger support at the provincial level to offset the risks and costs associated with policy innovation. District T, influenced by fiscal pressure and industrial transition, was uncertain about the potential benefits of participating in the demonstration project and thus demonstrated low initial willingness to cooperate. These divergences led to significant obstacles in intergovernmental coordination.

To accelerate the progress of the demonstration initiative, Province H introduced a series of supportive policies. First, it established systematic standards for watershed and regional governance based on the ecological status of key areas, providing a policy framework for localities such as City S. In addition, City S received preferential policy treatment in land-use planning and industrial restructuring and was granted a strategic role in the *Provincial Plan for the J River Ecological Economic Belt (2014–2025)*, supporting its development as a modern, eco-friendly regional center. Province H also encouraged City S to transcend administrative boundaries by promoting the establishment of ecological economic develop-

16 Yasuda, J. (2021). Regulatory Scaffolding: Food Safety Politics in Federal, Unitary, and Multilevel Systems 1. *China Policy Journal*, 2(1).

ment pilot zones and actively facilitated international cooperation, such as the UK–China Eco-City pilot project in City S.

Support for these policies effectively reduced intergovernmental coordination costs, strengthened City S's motivation to engage in experimentation, and encouraged cooperation with District T. However, in the early stages, City S did not provide sufficient incentives to District T, resulting in continued low cooperation willingness and resistance to the demonstration effort.

To enhance implementation capacity, Province H adopted a dual approach of incentives and sanctions. In line with the *National Demonstration Zone Construction Plan*, which emphasized lifetime accountability for ecological governance, Province H established stricter reward-and-punishment mechanisms, upgraded its performance evaluation system, and incorporated demonstration results into annual government performance appraisals, thereby increasing political pressure on lagging local governments.

Against this backdrop, City S increased its support for District T by establishing dedicated funds, offering preferential market policies, and proactively attracting private investment to participate in the demonstration trial. These measures enhanced District T's motivation to participate, eventually leading to full cooperation and the formation of a cross-level collaborative policy experimentation mechanism involving the Province H, City S, and District T.

After several years of experimentation and innovation, City S achieved significant results and, in 2019, was awarded the title of *National Ecological Civilization Demonstration City* by the Ministry of Ecology and Environment—marking a milestone in the success of this policy experiment.

This case demonstrates the real-world relevance of the theoretical and simulation-based conclusions presented earlier. The policy incentives, performance assessments, and fiscal transfers provided by provincial governments play a critical role in cross-level intergovernmental collaboration. The motivation of local governments to participate in policy experiments depends not only on their internal resource capacities but also on external policy signals from higher levels. As an intermediary actor, the municipal government is responsible for aggregating governance resources from the upper level and redistributing them downstream.

The informal contractual relationship between City S and District T, especially the embedded penalty mechanisms, significantly shapes their willingness to collaborate. Moreover, for District T, whose policy innovations must ultimately be implemented and evaluated in local practice, the perceptions and responses of policy recipients within the jurisdiction become crucial variables in shaping intergovernmental collaboration dynamics.

To align the model findings with the case analysis, we created a Table 5 that systematically organizes the key elements.

Table 5. Correspondence between the Game Model Findings and Case Evidence

Core Finding from Evolutionary Game Analysis	Case Context	Policy Actions	Impact on Cross-Level Collaboration
Path dependence and sensitivity to initial participation	Initial differences in willingness of Province H, City S, and District T	City S had limited resources; District T was hesitant; Province H adopted a cautious stance	Low initial cooperation, slowing policy implementation
Dominant leadership role of the provincial government	Province H introduced systematic governance standards, provided fiscal and policy support, and promoted international pilot projects	Reward mechanisms, policy preferences, ecological-economic development initiatives	Increased participation willingness of City S and District T, accelerating convergence toward full cooperation equilibrium
Intermediary role of the municipal government	City S coordinated resources and supported District T	Dedicated funds, market incentives, attracting private investment	Municipal government's actions strongly influenced district-level cooperation, creating a top-down diffusion mechanism
Positive incentives outperform punitive measures	District T initially did not cooperate; Province H and City S provided policy and financial incentives	Reward policies, performance evaluations incorporated into annual assessments	Promoted sustained cooperation; punitive measures had limited and short-term effects, while positive incentives were more effective

4. Conclusion and Discussion

On the basis of the assumption of bounded rationality, this study employs evolutionary game theory to construct a collaborative policy experimentation payoff matrix involving a provincial government as the initiator, a municipal government as the coordinator, and a district government as the executor. This research systematically analyzes the strategic evolution process among these three levels of government in the context of cross-level collaboration. By integrating numerical simulations and case study analysis, the study explores the behavioral strategies of each actor and their influencing factors.

4.1 Conclusion

First, the influence of each actor's participation probability on the others is asymmetrical. On the one hand, the district government is less affected by the participation of provincial and municipal governments and is more influenced by the policy recipients within its jurisdiction. In contrast, the municipal government is more sensitive to the provincial government's participation. In the case study, City S's willingness to collaborate was more effectively activated than that of District T. On the other hand, the mutual influence between municipal and district governments is not symmetrical—District T is more responsive to changes in City S's participation probability. As demonstrated in the case, when City S's willingness to collaborate increased, coupled with the concentration of governance resources at the municipal level, District T's collaboration probability also rose accordingly.

Second, as the dominant force in local policy experimentation, the provincial government plays a critical role in structuring and sustaining cross-level collaborative relationships because of its organizational authority and resource coordination capacity. Different interorganizational relationships lead to different governance structures, which in turn affect organizational performance.[17] Unlike highly decentralized countries, where local policy experimentation is often driven from the bottom up, China's local policy experiments are largely guided by the top-down policy leadership of higher-level governments. This implies that provincial governments not only bear responsibility for policy design and resource allocation but also need to influence lower-level governments through administrative evaluations, fiscal transfers, and strategic incentives, ensuring smooth implementation and alignment with overarching policy objectives.

Third, the district government, as the implementing actor, must ensure that the policy innovations driven by experimentation are grounded in local realities and subject to public scrutiny. This means that district-level participation must be aligned not only with upper-level policy directives but also with the economic conditions, industrial structure, and social needs of the jurisdiction. Furthermore, policy experimentation should not be viewed as a government-alone endeavor; rather, it requires the activation of societal creativity and vitality. Successfully embedding social actors into the government-led policy innovation process is essential to achieving feasible and sustainable outcomes.

4.2 Discussion

The main theoretical contribution of this study lies in its contextualization within China's governance setting, revealing the operational logic of a centrally advocated policy experimentation mechanism—policy demonstration—which differs from that of conventional locally

17 Wang, W. J. (2024). Power Balance, Institutionalization, and the Governance of Serendipitous Networks. *China Policy Journa*l, 3(1), 49-75.

initiated pilot programs. Simultaneously, it analyzes how provincial, municipal, and district governments engage in collaborative policy experimentation during the implementation of policy demonstrations, as well as the underlying logic governing such cross-level cooperation. Building on this, collaborative policy experimentation refers to a mode of policy experimentation that arises under a centrally advocated, top-down policy experimentation mechanism—specifically, the advancement of policy demonstrations—where provincial, municipal, and district governments engage in tight coordination on the basis of specific organizational structures and incentive mechanisms. Within this mode, each level of government not only assumes its differentiated policy responsibilities but also dynamically adjusts its strategies in response to the actions and feedback of other levels, facilitating information sharing, optimized resource allocation, and mutual incentives or constraints. This process promotes the coordinated implementation and institutionalization of policy innovations. This definition emphasizes not only the tight and institutionalized nature of cross-level collaboration but also the dynamic and mechanism-driven characteristics of collaborative experimentation, thereby providing a theoretical framework for understanding how policy demonstrations operate effectively in practice. Moreover, most previous studies have focused on policy experimentation at the central and local levels and lack a systematic analysis of cross-level collaboration among local governments. By introducing a cross-level interaction perspective, this study expands the understanding of policy experimentation mechanisms and specifically reveals the strategic interactions and collaborative dynamics among multiple levels of government.

This study has several limitations. First, the findings are based on a small set of typical cases, which may not fully capture the diversity of policy demonstration practices across different provinces, cities, and districts in China. As a result, the generalizability of the conclusions to other regions may be limited, and future research could expand the sample size or conduct large-scale comparative analyses. Second, the evolutionary game model relies on simplifying assumptions regarding payoff functions, strategy sets, and incentive mechanisms. While the model provides a useful framework for understanding dynamic interactions among provincial, municipal, and district governments, it cannot fully account for the complexity of real-world policy progress, where nonrational behavior, political bargaining, and unexpected events may influence decisions. Future studies on policy demonstrations will rely on continued exploration and expansion by the academic community.

Appendix: ESS solution

Construction of the Expected Payoff Function

From Tables 1 and 2, we can derive the expected payoff functions and average expected payoffs for the provincial, municipal, and district governments when choosing strategies during the game. Specifically, the expected payoff functions for the provincial government when it chooses to participate U_{g1} or not participate U_{g2}, as well as its average expected payoff U_g^m, are as follows:

$$\begin{cases} U_{g1} = yz(R_1 - G_1 - G_2) + y(1-z)(R_1 - G_1) + (1-y)z(R_1 - G_1 - G_2) + (1-y)(1-z)(R_1 - G_1) \\ U_{g2} = yzbR_1 + y(1-z)bR_1 + (1-y)zbR_1 + (1-y)(1-z)bR_1 \\ U_g^m = xU_{g1} + (1-x)U_{g2} \end{cases}$$

The expected payoffs for the district government when it chooses to cooperate $\boldsymbol{U_{e1}}$ and not cooperate $\boldsymbol{U_{e2}}$, as well as its average expected payoff U_e^m, are defined as follows:

$$\begin{cases} U_{e1} = zx[R_2 + aR - t(C-S)] + (1-z)x[R_2 - t(C-S) + W] + (1-x)z(R_2 + aR - tC) + (1-y)(1-x)(R_2 - tC + W) \\ U_{e2} = zx(R_2 + L_1 - K) + (1-z)xR_2 + z(1-x)(R_2 - K - L_1) + (1-z)(1-x)R_2 \\ U_e^m = yU_{e1} + (1-y)U_{e2} \end{cases}$$

The expected payoffs for the municipal government when it chooses to cooperate U_{s1} and not cooperate U_{s2}, as well as its average expected payoff U_S^m, are defined as follows:

$$\begin{cases} U_{s1} = xy[R_3 + (1-a)R - (1-t)(C-S) + G_2] + (1-y)x[R_3 - (1-t)(C-S) \\ +K + G_2 + (1-x)y[R_3 + (1-a)R - (1-t)C] + (1-x)(1-y)[R_3 - (1-t)C + K] \\ U_{e2} = xy(R_3 + L_2 - W) + (1-y)xR_3 + y(1-x)(R_3 + L_2 - W) + (1-y)(1-x)R_3 \\ U_s^m = zU_{s1} + (1-z)U_{s2} \end{cases}$$

Solving Evolutionarily Stable Strategies Using Replicator Dynamic Equations

On the basis of the preceding analysis, the replicator dynamic equations for the provincial government, district government, and municipal government are derived as follows:

$$\begin{aligned} F(x) = \frac{dx}{dt} &= x\left(U_{g1} - U_g^m\right) \\ &= x(1-x)[yz\Big((1-b)R_1 - G_1 - G_2 + y(1-z)\big((1-b)R_1 - G_1\big) \\ &\quad + (1-y)z(1-b)R_1 - G_1 - G_2\Big) + (1-y)(1-z)(1-b)R_1 - G_1)] \\ &= x(1-x)[(1-b)R_1 - G_1 - zG_2 \end{aligned}$$

$$\begin{aligned} F(y) = \frac{dy}{dt} &= y(U_{e1} - U_e^m) \\ &= y(y-1)\{xz[aR - t(C-S) - L_1 + K] \\ &\quad + x(1-z)[W - t(C-S) + (1-x)z(aR - tC + K - L_1) \\ &\quad + (1-x)(1-z)(W - tC)\} \\ &= y(1-y)[xtS - tC + z(aR + K - L_1 - W) + W] \end{aligned}$$

$$F(z) = \frac{dz}{dt} = z(U_{s1} - U_s^m)$$
$$= z(1-z)\{xy[(1-a)R - (1-t)(C-S) + G_2 - L_2 + W]$$
$$+ x(1-y)\big(K + G_2 - (1-t)(C-S)\big) + (1-x)(1-y)[K - (1-t)C]\}$$
$$= z(1-z)\{x[(1-t)S + G_2] + y[(1-a)R + W - L_2 - K] + K - (1-t)C\}$$

By combining the three replicator dynamic equations, we obtain the replicator dynamic system that characterizes the evolutionary interactions among the three levels of government:

$$\begin{cases} F(x) = x(1-x)[(1-b)R_1 - G_1 - zG_2 \\ F(y) = y(1-y)[xtS - tC + z(aR + K - L_1 - W) + W] \\ F(z) = z(1-z)\{x[(1-t)S + G_2] + y[(1-a)R + W - L_2 - K] + K - (1-t)C\} \end{cases}$$

On the basis of the replicator dynamic system, the Jacobian matrix of the tripartite evolutionary game system can be derived as follows:

$$j = \begin{matrix} (1-2x)[(1-b)R_1 - G_1 - zG_2] & y(1-y)tS & -x(1-x)G_2 \\ y(1-y)tS & (1-2y)[xtS - tC + z(aR + K - L_1 - W) + W] & y(1-y)(aR + K - L_1 - W) \\ z(1-z)[(1-t)S + G_2] & z(1-z)[(1-a)R + W - L_2 - K] & (1-2z)\{x[(1-t)S + G_2] + y[(1-a)R + W - L_2 - K] + K - (1-t)C\} \end{matrix}$$

In this system, by setting the three replicator dynamic equations equal to zero, we obtain the local equilibrium points as follows:

$E_1(0,0,0)$, $E_2(0,0,1)$, $E_3(0,1,0)$, $E_4(0,1,1)$, $E_5(1,0,0)$, $E_6(1,0,1)$, $E_7(1,1,0)$, and $E_8(1,1,1)$.

According to Lyapunov's first method, if all the eigenvalues of the Jacobian matrix at a given equilibrium point have negative real parts, the equilibrium point is asymptomatically stable.

Integrating Quantity and Quality: Evidence from Water Rights Trading's Dual Policy Effects on Water-Use Efficiency and Water Environmental Quality

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Abstract

China's water governance confronts concurrent pressures of water scarcity and pollution, yet evidence on whether market-oriented water rights trading (WRT) policies improve water outcomes remains limited. This study examines the dual dimensions of water—quantity and quality—by estimating the causal impacts of WRT pilots on water-use efficiency and water environmental quality. Drawing on both nationally mandated and locally initiated WRT pilots, we compile a panel of 31 provinces spanning 2003 to 2023 and employ a difference-in-differences (DID) design and synthetic control methods (SCM). The analysis yields four key findings:

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(1) the implementation of WRT policy significantly increases water-use efficiency, with an average increase of 25.6%; (2) although DID analyses do not consistently detect national-level effects on water quality, the SCM analyses identify notable improvements in a subset of pilot provinces; (3) further analysis indicates that efficiency improvements are more pronounced in central and northern provinces and in provinces with higher levels of marketization; and (4) the mechanism analysis suggests that efficiency improvements are mainly achieved through optimization of water-use structure, while water quality enhancements are primarily via strengthened governance intensity. By integrating analyses of water efficiency and quality outcomes, this study reframes WRT as a two-dimensional policy instrument, highlighting its potential to reconcile development and environmental goals in water governance.

Keywords: Water rights trading, water-use efficiency, water environmental quality, water markets, policy pilots

Integración de cantidad y calidad: evidencia de los efectos duales de la política de comercio de derechos de agua sobre la eficiencia del uso del agua y la calidad ambiental del agua

Resumen

La gobernanza del agua en China se enfrenta a presiones concurrentes de escasez y contaminación hídrica, pero la evidencia sobre si las políticas de comercio de derechos de agua (WRT) orientadas al mercado mejoran los resultados hídricos sigue siendo limitada. Este estudio examina la doble dimensión del agua (cantidad y calidad) estimando los impactos causales de los proyectos piloto de WRT en la eficiencia del uso del agua y la calidad ambiental del agua. Basándonos en proyectos piloto de WRT tanto exigidos a nivel nacional como iniciados a nivel local, compilamos un panel de 31 provincias que abarcan el período 2003-2023 y empleamos un diseño de diferencias en diferencias (DID) y métodos de control sintéticos (SCM). El análisis arroja cuatro hallazgos clave: (1) la implementación de la política de WRT aumenta significativamente la eficiencia del uso del agua, con un aumento promedio del 25,6%; (2) aunque los análisis DID no detectan de manera consistente efectos a nivel nacional en la calidad del agua, los análisis SCM identifican mejoras notables en un subconjunto de provincias piloto; (3) un análisis más detallado indica que las mejoras de eficiencia

son más pronunciadas en las provincias centrales y septentrionales y en las provincias con mayores niveles de mercantilización; y (4) el análisis de mecanismos sugiere que las mejoras en la eficiencia se logran principalmente mediante la optimización de la estructura del uso del agua, mientras que las mejoras en la calidad del agua se logran principalmente mediante el fortalecimiento de la intensidad de la gobernanza. Al integrar los análisis de los resultados de eficiencia y calidad del agua, este estudio replantea la gestión del agua como un instrumento de política bidimensional, destacando su potencial para conciliar los objetivos de desarrollo y ambientales en la gobernanza del agua.

Palabras clave: Comercio de derechos de agua, eficiencia en el uso del agua, calidad ambiental del agua, mercados del agua, políticas piloto

整合量与质：水权交易对用水效率与水环境质量的双重政策影响证据

摘要

中国水治理正同时面临水资源短缺和水环境污染的双重压力，然而，关于市场导向的水权交易（WRT）政策能否改善水治理绩效的经验证据仍然有限。本研究从水资源的量质双重属性出发，评估水权交易试点对水资源利用效率与水环境质量的因果影响。基于国家主导和地方自主发起的水权交易试点，研究构建了覆盖2003至2023年间31个省份的面板数据，并采用双重差分（DID）设计和合成控制法（SCM）进行分析。研究得出四点主要结论：（1）水权交易政策的实施显著提升了水资源利用效率，平均增幅约为25.6%；（2）尽管DID分析未能识别出该政策对水质的全国范围内的影响，但SCM分析发现在部分试点省份中出现明显的水质改善效果；（3）进一步分析表明，用水效率的提升在中部和北部省份以及市场化程度较高的省份中更为显著；（4）机制分析表明，用水效率提升主要通过用水结构的优化实现，而水质改善则主要归因于水治理强度的增强。通过同时考察水权交易政策对用水效率与水质量的影响，研究将水权交易重新界定为一种兼具经济与环境双重功能的政策工具，凸显了其在水治理中统合发展与环境目标的潜力。

关键词：水权交易；用水效率；水环境质量；水市场；政策试点

1. Introduction

Water governance in China is increasingly challenged by the interplay of physical scarcity, deteriorating water quality, and uneven exposure to environmental risks (Dou and Wang 2016; Wang 2017). Existing evidence shows that water pollution compounds the problem of scarcity and exacerbates regional disparities (Ma et al. 2020), highlighting that "quality" is not ancillary to "quantity" but is a co-equal attribute of water resources that shapes allocative outcomes. Addressing these challenges calls for the development of innovative policy tools that are adaptive to dynamic watershed conditions. Water rights trading (WRT), as a market-oriented mechanism (Zhang et al. 2021), provides a potential pathway forward. At its core, WRT establishes property rights that are clearly defined, transferable, and enforceable, thus enabling water to be allocated more efficiently toward higher-valued uses (Matthews 2004; Rosegrant and Binswanger 1994; Vaux Jr. and Howitt 1984). Since the 1980s, various Western countries, including Australia (Bischoff-Mattson and Lynch 2016; Wheeler et al. 2014), Chile (Hearne and Easter 1997), and the United States (Brookshire et al. 2004; Debaere et al. 2014), have implemented WRT. Lessons drawn from these international experiences underscore the potential for WRT to address both water scarcity and pollution (Boretti and Rosa 2019).

Within the context of China, the initiation of WRT can be traced back to the "millennium debate" over the legal and institutional frameworks for managing and utilizing water resources (Wang 2017). In its initial stage, however, WRT lacked a formalized and comprehensive trading system, which limited both its reach and effectiveness (Jia et al. 2016). This began to change in 2014, when the central government launched a series of pilot reforms under top-down national initiatives (Zhang et al. 2021; 2025). In parallel, several local governments initiated bottom-up local pilots, resulting in a staggered rollout across provinces at different times. Implemented in 10 provinces, these pilots have gradually institutionalized key components such as rights confirmation, allocation, and trading mechanisms, laying the foundation for a national water-rights system. The non-simultaneous adoption across provinces provides a quasi-natural experimental setting to evaluate the socioeconomic and environmental effects of WRT—for instance, its influence on rural household income and water-use efficiency (Zhang et al. 2025; 2021; Yan et al. 2024).

Previous literature has underscored the efficiency rationale behind tradable water rights, emphasizing their potential to reallocate water across sectors and regions as a means to mitigate scarcity (Matthews 2004; Vaux Jr. and Howitt 1984). In the Chinese context, recent empirical studies have linked WRT and related reforms to outcomes such as irrigation savings, industrial development, and changes in farmers' behavior. However, these studies tend to conceptualize "policy success"

primarily in quantity terms—such as volumes of water saved, gains in productivity, or reported conservation intentions—while paying relatively little attention to the impacts on water environmental quality (Su and Fu 2024; Zhang et al. 2021). Concurrently, modeling research has begun to integrate both quantity and quality, revealing that optimal water allocation is often constrained by water quality considerations. These studies show that pricing and trading rules that ignore pollution dynamics risk misallocating the resource (Martinsen et al. 2019; Ward and Pulido-Velazquez 2008). In response, institutional and market designs have been proposed that reconceptualize water rights as multi-dimensional instruments, combining volumetric entitlements with water quality attributes or compliance obligations. Such frameworks have been advanced for basin-level allocation (Wang et al. 2020) and for "two-dimensional" trading systems that incorporate risk and pollution externalities into pricing mechanisms (Di et al. 2020).

Yet despite these theoretical and modeling contributions, empirical evaluations quantifying the effects of WRT adoption on water quality remain scarce. Moreover, a limitation in prior empirical studies concerns the definition of policy treatment. While some studies code only the seven nationally designated pilots launched in 2014 as adopters (e.g., Zhang et al. 2025; Yan et al. 2024), others take a broader approach, including provinces with only nominal or limited WRT activity (e.g., Zhang et al. 2021). Addressing these gaps, we therefore reconstruct a province-level chronology of WRT pilot implementation and ask: whether, how, and to what extent the WRT adoption affects provincial water-use efficiency and water environmental quality?

To answer these questions, we assemble a panel covering 31 mainland provinces from 2003 to 2023, identify both centrally designated and locally initiated WRT pilots, and estimate causal effects using a staggered DID design complemented by province-specific Synthetic Control Methods (SCM) case studies. This mixed-method approach allows us to isolate average policy effects while also detecting province-specific impacts that a single pooled estimator might overlook. The analysis yields four main findings. First, WRT adoption is associated with sizable and statistically robust improvements in water-use efficiency, with an estimated 25.6% increase relative to the counterfactual. Second, the aggregate national effects on water quality are not uniform; the SCM results reveal clear post-adoption quality improvements in a subset of pilot provinces. Third, efficiency gains are more pronounced in central and northern provinces and in provinces with higher marketization. Fourth, the mechanism analysis demonstrates that efficiency improvements stem from the optimization of water-use structures—as WRT reallocates water from agriculture toward higher-value industrial and urban uses—while water-quality gains arise primarily via strengthened governance intensity, reflected in increased capital investment and spending on wastewater treatment facilities.

Taken together, this study makes at least four contributions. First, conceptually, we recast WRT as a two-dimensional policy instrument, in which the object of exchange is inherently composite—encompassing quantity and quality. This framing highlights the need for market transactions to be embedded within regulatory frameworks that align private trading behavior with environmental standards (Martinsen et al. 2019; Z. Wang et al. 2020; Ward and Pulido-Velazquez 2008). Second, empirically, we employ a quasi-experimental design to estimate the causal effects of WRT adoption on both water-use efficiency and ambient water quality, thereby extending a literature that has largely focused on conservation outcomes (Zhang et al. 2021). Third, methodologically, we bridge top-down and bottom-up pilots and exploit staggered rollout of WRT pilots across provinces. By combining DID with SCM methods, we reduce the risk of scope bias and capture province-specific water quality dynamics that would otherwise remain hidden in pooled estimation. Finally, for policy practitioners, our findings suggest that scaling up WRT to meet both efficiency and environmental objectives requires moving beyond a narrowly defined "volume-only" approach toward more integrated designs that account for water quality externalities. Overall, this study contributes to broader debates around the instrument choice versus policy mixes in complex water governance systems (Heikkila 2017; Whitford and Clark 2007).

2. Literature Review and Hypotheses

2.1 Literature Review

WRT is a market-based allocation instrument built on clearly defined, enforceable use rights and transferable entitlements that move scarce water toward higher marginal value uses via price signals (Matthews 2004; Vaux Jr. and Howitt 1984). Water rights, in this context, refer to the legal authorization to access and utilize water (Wurbs Ralph A. 1995). The conceptual foundation of introducing market mechanisms into water allocation has evolved since the 1980s, with the United States, Australia, and Chile pioneering formal markets (Hearne and Easter 1997; Poirier and Schartmueller 2012; Simpson and Ringskog 1997). Water markets have since become institutionalized in these countries—albeit under differing legal doctrines and regulatory frameworks—demonstrating varied institutional paths to tradability (Brookshire et al. 2004; Debaere et al. 2014; Grafton et al. 2011; Hearne and Easter 1997; Wheeler et al. 2014; Zeff Harrison et al. 2019). Doctrinally, legal systems governing water rights generally fall into three broad categories: riparian rights, prior appropriation, and public allocation. China represents the public allocation model, where water rights are granted through administrative permits under a regime of public ownership (Di et al. 2020; Wang Lizhong et al. 2007; Wang 2017).

Beyond allocation volume, the literature increasingly recognizes that

water rights encompass both quantity and quality dimensions (Wang et al. 2020; Ward and Pulido-Velázquez 2008). Quantity rights specify the allowable volume of water withdrawals or deliveries, whereas quality constraints determine the usable portion of that volume, depending on ambient pollution levels and regulatory standards. Recent studies have advanced two-dimensional policy designs that jointly allocate withdrawal rights and pollutant discharge allowances within basin-level regimes. These designs frequently incorporate penalty-backed rules that curtail withdrawal entitlements when discharges exceed prescribed caps, thereby internalizing quality externalities into the same decision-making framework that governs volumetric use (Wang et al. 2022; Z. Wang et al. 2020). Basin optimization models that integrate surface and groundwater interactions along with environmental constraints further illustrate how tightening quality standards alters feasible allocations (Martinsen et al. 2019) — such as in the Rio Grande (Ward and Pulido-Velázquez 2008). In China, the shift in water governance from infrastructure-dominated paradigm to a management-focused approach, and the integration of allocation with pollution control, reflects an institutional embrace of these two-dimensional models (Jia et al. 2016).

On the quantity side, the efficiency logic is well established. Clearly specified, transferable rights allow price signals to reveal marginal values, thereby reallocating water from lower- to higher-productivity uses and promoting conservation (Hadjigeorgalis 2009; Lund Jay R. and Israel Morris 1995; Rosegrant and Binswanger 1994; Vaux Jr. and Howitt 1984; Zeff Harrison et al. 2019). A range of modeling studies employing stochastic programming under hydrologic uncertainty, bargaining-based price formation, and risk-averse two-dimensional trading frameworks consistently find robust reallocation and conservation gains (Di et al. 2020; Fu et al. 2016; Schmidt 2007; Tsvetanov and Earnhart 2020; Wang et al. 2022). Empirical evidence from China's WRT pilots supports these theoretical claims. Observed agricultural water savings align with clarified quota allocations and incentive-compatible contractual arrangements (Zhang et al. 2021). Moreover, sector-specific analyses reveal patterns of water transfers from low- to high-value uses, accompanied by improved technologies in irrigation systems and cropping choices (Lv et al. 2021).

By contrast, rigorous causal evaluation of WRT's impacts on water environmental quality remains relatively limited compared to those focusing on quantity outcomes. Although integrated hydrologic-economic models co-optimize withdrawals and pollution abatement—indicating how initial allocations and trading rules can be designed to meet ambient quality standards (Martinsen et al. 2019; Ward and Pulido-Velazquez 2008; Wong and Eheart 1983)—a number of studies suggest that empirical policy assessments still tend to underemphasize quality-related effects (Grantham and Viers 2014; Wang et al. 2020). At the same time, macro-evidence shows that pollution

not only exacerbates scarcity but also intensifies regional inequities, underscoring the importance of ensuring that improvements in allocation efficiency do not come at the expense of resource usability (Ma et al. 2020). These concerns point to the need for more targeted empirical assessment of WRT's dual impacts on both water-use efficiency and environmental quality.

2.2 Hypotheses

WRT enhances overall efficiency and encourages the adoption of conservation technologies by establishing well-specified and transferable use rights (Chong and Sunding 2006; Lund Jay R. and Israel Morris 1995; Rosegrant and Binswanger 1994; Zeff Harrison et al. 2019). Evidence from China's pilots is consistent with this logic. Agricultural water saving has been observed in contexts where quotas allocations and transfer rules are perceived as credible (Fu et al. 2016; Zhang et al. 2021). Additionally, dynamic bargaining models and risk-averse formulations suggest that endogenous price and quantity adjustments co-evolve with policy parameters and institutional reliability constraints, thereby preserving incentives while mitigating risk (Di et al. 2020; Wang et al. 2022). Sector-specific studies further demonstrate that trading mechanisms can induce technology adoption and reallocate water to higher-value crops and uses (Lv et al. 2021). Based on these arguments, we propose Hypothesis 1:

H1: The adoption of WRT policy improves water-use efficiency.

When water entitlements are clearly defined and made tradable, price signals can guide the reallocation of water from low-productivity and water-intensive uses toward higher-value sectors, crops, and technologies. Evidence from mature water markets indicates that trading tends to shift water from annual field crops to perennial horticulture, as well as industrial and urban uses. It also promotes the uptake of more efficient irrigation methods and facilitates crop switching (Wheeler et al. 2014; Debaere et al. 2014). This kind of structural adjustment not only improves the marginal productivity of water use but also increases allocative flexibility across time and hydrologic conditions (Young and McColl 2003). In line with these findings, macro-level studies have linked improvements in water productivity to broader transitions toward less water-intensive activities (Debaere and Kurzendoerfer 2015). More recent empirical research from China further confirms this mechanism, showing WRT policies have significantly promoted water transfers from agricultural to industrial sectors, thereby improving the overall efficiency of water use (Yan et al. 2024). Taken together, we argue that WRT contributes to water-use efficiency primarily by reshaping the water-use structure. Accordingly, we propose the Hypothesis 2:

H2: The adoption of WRT policy optimizes water-use structure, thereby improving water-use efficiency.

The environmental effectiveness of WRT depends on whether trading is embedded within regulatory frame-

works that explicitly link water use to water quality. Two-dimensional regimes that jointly assign withdrawal and discharge rights, impose real-time, penalty-backed adjustments, and integrate surface-groundwater dynamics align private trading incentives with ambient water quality standards. These institutional features channel water toward cleaner producers or users with lower marginal abatement cost, while discouraging pollution-intensive rebound effects (Karamouz et al. 2010; Martinsen et al. 2019; Wang et al. 2022; Wang et al. 2020; Ward and Pulido-Velazquez 2008; Wong and Eheart 1983). From a Free-Market Environmentalism perspective, environmental externalities can be internalized through market signals—if entitlements are enforceable, and quality is priced appropriately. For example, higher prices for high-quality water and making tradability contingent on meeting environmental standards both create incentives for purification efforts (Delorit and Block 2018). Given that agricultural nonpoint source pollution plays a critical role in determining overall water usability, the co-benefits of WRT depend heavily on whether trading rules account for sectoral externalities. This is especially important in contexts where pollution intensifies water scarcity and regional inequities (Dabrowski et al. 2009; David and Hughes 2024; Grantham and Viers 2014; Ma et al. 2020; Z. Wang et al. 2020). Based on this reasoning, we propose Hypothesis 3:

H3: The adoption of WRT policy improves water environmental quality.

Theories of property rights and tradable-permit suggests that market-based mechanisms can increase the demand for monitoring, reporting, and sanctions, thereby intensifying governance over both water extraction and pollution (Coase 2013; Ostrom 1990). As a market-based policy instrument, WRT assigns monetary value to water entitlements, encouraging users to reduce both water consumption and pollutant discharge by investing in efficiency improvements and abatement technologies (Stavins 2003). Empirical evidence from China supports this mechanism. The implementation of WRT policies has shown to stimulate green innovation and reduce pollution levels, with stronger effects observed in regions with higher pollution burdens and stronger regulatory capacity. These patterns suggest that WRT may drive governance intensification via improved metering, the development of trading platforms, and the enforcement of binding constraints (Chen et al. 2024). Similar results have been found in other environmental permit systems, such as pollution and carbon trading programs, where emission reductions are more pronounced in jurisdictions with robust legal and regulatory institutions (Tang et al. 2025). Taken together, we propose Hypothesis 4:

H4: The adoption of WRT policy increases the intensity of water pollution governance, thereby improving water environmental quality.

3. Policy Context, Empirical Design, Data, and Variables

3.1 Policy Context

China began experimenting with market-oriented instruments in water governance as early as the 1980s, most notably through the implementation of water-pollutant discharge fee system (Shen and Guna 2018). Building on this foundation, the development of WRT policy unfolded gradually from the early 2000s (Wang 2017). Initial efforts were limited to small-scale, localized experiments—such as the 2000 inter-municipal transfer between Dongyang and Yiwu in Zhejiang and the 2004 guidance on Yellow River main-stem conversion in Inner Mongolia and Ningxia. However, these early pilots were administratively narrow, geographically limited, and short-lived (Jia et al. 2016). A major turning point came on June 30, 2014, when the Ministry of Water Resources officially launched a nationally designated pilot program in seven provincial units: Inner Mongolia, Ningxia, Jiangxi, Henan, Hubei, Guangdong, and Gansu. These provinces were tasked with definition, registration, and facilitating transactions of water use rights. In parallel, a bottom-up trajectory emerged in several provinces that had already begun local experimentation and subsequently formalized these practices through provincial rules. For example, Shaanxi advanced from interim municipal measures in Baoji (2010) to province-wide trading rules by 2017. Shandong issued the Jining pilot plan in 2014 and later introduced provincial guidance to support the establishment of a WRT platform. Hebei initiated province-level registration rules from 2013–2014, followed by agricultural trading measures in 2016. As of 2023, ten of China's 31 provincial-level regions had implemented formal WRT pilots. Figure 1 presents the geographic distribution of these pilots, distinguishing between nationally mandated and locally initiated efforts.

Figure 1. Distribution of WRT Pilots in China

It is worth noting that, prior studies define treatment inconsistently. Some code only the seven nationally designated pilots launched in 2014 as adopters (e.g., Zhang et al. 2025; Yan et al. 2024), while others apply a much broader definition that also includes so-called "provincial pilots" in jurisdictions such as Shandong, Zhejiang, Xinjiang, Fujian, Liaoning, Hebei, Hunan, Shaanxi, Shanxi, Jilin (e.g., Zhang et al. 2021). To avoid both under- and over-coverage, we reconstruct the adoption timeline directly from provincial regulations and official notices and we treat as adopters the seven national pilots plus three provinces that have established province-wide rules and trading platforms.

3.2 Empirical Design

The implementation of WRT pilots across Chinese provinces provides a quasi-natural setting for empirical analysis. While some provinces adopted the program—either through national designation or local initiatives—others did not, resulting in systematic variation in policy exposure over time across regions. By incorporating locally initiated pilots alongside the seven national pilots, we expand the treatment group to ten provinces, thereby capturing the broader and more heterogeneous diffusion of the policy. Based on this refined treatment definition, we employ a DID framework, which is well suited for identifying causal impacts in policy evaluations. By exploiting staggered adoption across provinces, DID enables us to isolate the net effects of WRT pilots while controlling for unobserved, time-invariant heterogeneity and for common shocks that affect all provinces in a given year. Formally, equation (1) specifies the empirical framework:

$$Y_{it} = \alpha + \beta(WRT \times Post)_{it} + \varphi CV_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Where Y_{it} denotes the outcome variable of interest—measured alternately as water-use efficiency or water quality indicators—in province *i* during year *t*. The interaction term $(WRT \times Post)_{it}$ captures the treatment exposure, taking a value of 1 for provinces participating in the WRT pilot during the post-adoption period, and 0 otherwise. The coefficient, β, identifies the average treatment effects of WRT on the outcomes. The control vector CV_{it} includes time-varying covariates such as economic structure, resource endowments, and other confounding determinants of water use or pollution levels. Province fixed effects μ_i account for unobserved, time-invariant differences across provinces, while year fixed effects λ_t absorb common shocks affecting all provinces in a given year. The term ε_{it} represents the idiosyncratic error.

3.3 Data and Variables

Dependent variables. Data on provincial water-use efficiency are drawn from Yan et al. (2024), who estimate efficiency using the Global Non-radical Directional Distance Function (GNDDF) model. This measure captures how ef-

fectively water inputs are converted into economic output (i.e., gross domestic product, GDP) while simultaneously considering undesirable outputs such as water pollution. The value of water-use efficiency ranges from 0 to 1, with higher values indicating more efficient and sustainable water use. We obtained the dataset directly from the authors via e-mail correspondence to ensure consistency with their published methodology.

In addition, we evaluate water quality outcomes to capture the dual mandate of WRT. Although many other indicators of water quality—such as biochemical oxygen demand (BOD)—are theoretically available, many were incorporated into routine monitoring only in recent years and therefore lack consistent, long-term coverage at the provincial level. In contrast, DO emissions (10,000 tons) and NH_3-N emissions (10,000 tons) have been systematically recorded for a much longer period and offer full temporal coverage across the study window. We thus use DO and NH_3-N—two widely recognized indicators of surface water quality and pollution load—to measure the changes in water environmental quality. Data for DO and NH_3-N emissions were extracted from the *China Environment Database* available through the EPS platform (https://www.epsnet.com.cn). It is worth noting that all dependent variables used in this study are originally drawn from provincial-level official datasets. We do not rely on real-time data from river basins or monitoring stations.

Policy variable. The key explanatory variable is an interaction term, $(WRT \times Post)_{it}$, capturing a province's exposure to the WRT policy. This variable takes the value of 1 for provinces that adopted WRT pilots—whether through national designation or via locally initiated programs—during the post-adoption period, and 0 otherwise. Provinces that did not adopt WRT at any point during the study period are coded as 0 for all years. Information on pilot adoption was compiled through systematic manual searches of official provincial government websites and policy archives, and cross-verified using the Law Star database (http://law1.law-star.com).

Control variables. To mitigate potential confounding influences on water-related outcomes, we include a set of time-varying control variables, following prior studies (Yan et al. 2024; Zhang et al. 2021). Data for these variables are sourced from the *China Macro-Economic Database* and the *China Environment Database*, both accessed via the EPS platform. These controls capture differences in economic development, resource endowments, and structural characteristics of provincial economies. Specifically, GDP (in billion CNY) reflects the overall scale of economic activity, while per capita water resources (1,000 m^3 per person) proxy for the natural availability of water. To capture sectoral demand, we include agricultural and industrial water use (billion m^3), which differentiate consumption intensity between primary and secondary sectors. Additionally, the GDP shares of primary and second-

ary industries are included to account for variation in economic structure, as provinces with more industrialized or resource-intensive economies may exhibit distinct patterns of water use and pollution.

In total, the dataset comprises 651 province-year observations spanning the period from 2003 to 2023. Among these, approximately 16.1 percent correspond to years in which provinces implemented WRT pilot. Table 1 summarizes the definitions and descriptive statistics for all variables. On average, water-use efficiency stands at 0.575 on a 0–1 scale, suggesting considerable potential for improvement across provinces. Indicators of water environmental quality display substantial heterogeneity. DO emissions average about 59.8 (10,000 tons), with wide dispersion, while NH_3-N emissions average 5.06 (10,000 tons), likewise reflecting uneven pollution pressures.

Table 1. Descriptive Statistics

Variables	Definitions	N	Mean	SD	Min	Max
Water Efficiency[a]	Efficiency indices range from 0 to 1	527	0.575	0.229	0.000	1.000
DO Emissions	Dissolved oxygen emissions (10,000 tons)	589	59.800	44.849	0.790	198.250
NH_3-N Emissions[b]	Ammonia nitrogen emissions (10,000 tons)	558	5.057	4.017	0.140	23.089
WRT × Post	Interaction term, measuring net policy effect of WRT pilots.	651	0.161	0.368	0.000	1.000
GDP	Gross Domestic Product (billion CNY)	651	2062.291	2175.335	18.909	13567.320
Per Capita Water	Per capita water resources (1,000 m^3/ person)	651	6.641	25.029	0.052	177.175
Agri Water Use	Water used in agriculture (billion m^3)	651	11.955	10.206	0.251	56.360
Indus Water Use	Water used in industry (billion m^3)	651	4.101	4.529	0.034	25.520
Primary Share	Share of primary industry in GDP (%)	651	10.935	5.935	0.200	37.013
Secondary Share	Share of secondary industry in GDP (%)	651	43.868	8.885	14.900	61.500

Note: [a] Water-use efficiency data cover the period 2005–2021; [b] NH_3-N emissions data cover 2004–2023; all other data span 2003–2023.

To contextualize causal estimates, we then visualize the spatial temporal distribution of the two outcomes—water-use efficiency and DO emissions—for the year 2009, 2014, and 2019. We apply within-year quantile breaks to highlight relative differences. As shown in Figure 2, water-use efficiency displays a persistent west–east divide. Higher quantile provinces are clustered on the western plateau (notably Tibet and Qinghai), with some additional clusters in the far south coastal areas (e.g., Guangdong and Hainan). In contrast, lower efficiency levels are concentrated in the central–eastern manufacturing belt, including the North China Plain and the middle–lower Yangtze region. This pattern remains broadly stable across the three time points. In terms of DO emissions, a clear gradient is observed: eastern and coastal provinces repeatedly appear in higher quantiles, whereas provinces in the northwest and plateau regions such as Xinjiang, Gansu, Ningxia, Qinghai and Tibet, tend to fall in the lower quantiles. Importantly, the spatial patterns of water-use efficiency and DO emissions are not colinear. Several plateau provinces combine high water-use efficiency and low DO emissions, while many coastal provinces show higher DO emissions but only moderate levels of water-use efficiency. For brevity, spatial maps of NH_3-N emissions are not shown.

4. Empirical Results

4.1 DID Analysis

4.1.1 Baseline Regression Results

Table 2 reports the estimated effects of the WRT pilot program on water-use efficiency and water quality outcomes. Columns (1) and (2) show the results for water-use efficiency, measured in both absolute levels and logarithmic terms. In both specifications, the estimated coefficients are positive and statistically significant at the 5% level, with magnitudes of 0.082 and 0.228, respectively. In logarithmic terms, this corresponds to roughly a 25.6% $((e^{0.228}-1)\times 100)$ improvement, implying that provinces participating in the pilot program experienced a substantial increase in water-use efficiency. These results lend support to Hypothesis 1 and are consistent with the conclusions of Yan et al. (2024).

Turning to environmental quality outcomes, column (3) shows that WRT pilots have a sizable and positive influence on DO emissions, with a coefficient of 14.649 that is statistically significant at the 5% level. This result suggests that the adoption of WRT improves ecological conditions of water bodies, consistent with expectations that more efficient water allocation may alleviate stress on water ecosystems. However, column (4) reveals that the estimated effect on NH_3-N emissions, while negative, is statistically insignificant. Moreover, the relatively large standard errors across models highlight the imprecision of the estimates, warranting caution when interpreting the magnitude or robustness of the water quality effects.

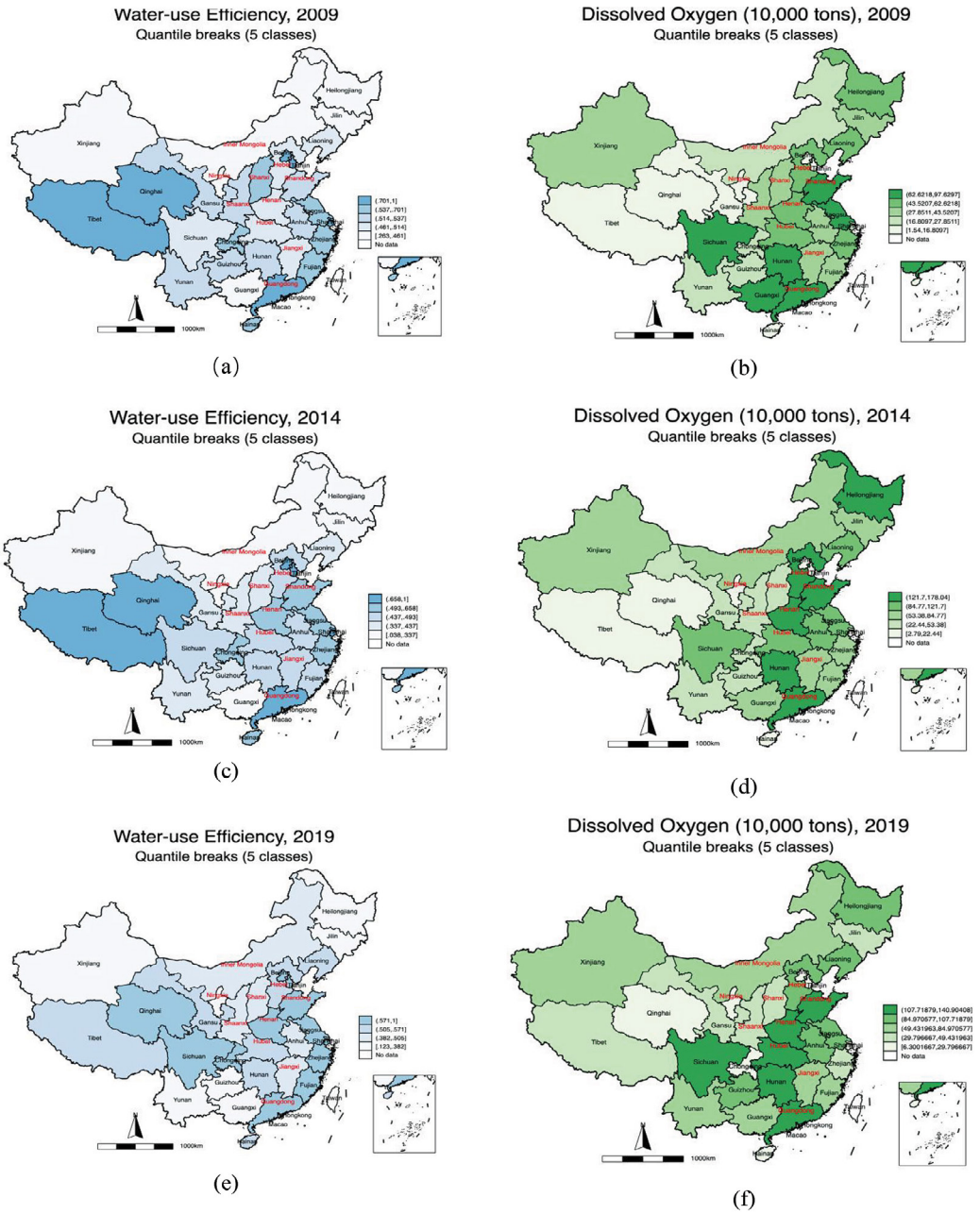


Figure 2. Spatial Distribution of Water-Use Efficiency and DO Emissions in 2009, 2014, and 2019

Note: Pilot provinces are labeled in red text.

Table 2. The Impacts of WRT on water-use efficiency and water quality

VARIABLES	(1)	(2)	(3)	(4)
	Water Efficiency	Ln (Water Efficiency)	DO Emissions	NH_3-N Emissions
WRT × Post	0.082**	0.228**	14.649**	-0.327
	(0.030)	(0.092)	(5.686)	(0.332)
Ln (GDP)	0.030	0.361	13.953	2.242*
	(0.079)	(0.442)	(17.319)	(1.299)
Ln (Per Capita Water)	0.003	-0.009	3.188	-0.611*
	(0.012)	(0.032)	(4.295)	(0.303)
Ln (Agri Water Use)	-0.147*	-0.477	28.513***	0.066
	(0.073)	(0.289)	(7.804)	(0.401)
Ln (Indus Water Use)	-0.058	-0.128	-1.640	-0.168
	(0.065)	(0.113)	(7.455)	(0.517)
Secondary Share	-0.008**	-0.023	-0.429	0.031
	(0.003)	(0.015)	(0.610)	(0.039)
Primary Share	-0.009	-0.020*	-0.065	0.068
	(0.006)	(0.011)	(1.197)	(0.069)
Province-fixed effects	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Constant	1.489**	-0.328	-194.879	-13.421
	(0.665)	(2.768)	(204.900)	(12.267)
Observations	493	493	551	522
Adjusted R-squared	0.912	0.737	0.832	0.866

Note: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. "YES" denotes the inclusion of province and year fixed effects; other tables follow the same convention.

4.1.2 Parallel Trend Test

To further validate the credibility of our identification strategy, we assess the parallel-trend assumption that underlies the DID framework. This assumption requires that, in the absence of WRT policy, treated and control provinces would have similar pre-treatment trajectories. If the condition holds, any post-treatment divergence can be more confidently attributed to the implementation of WRT pilots. To test this assumption, we employ an event-study specification that models the dynamic treatment effects over time, relative to the year of WRT adoption. Specifically, the estimation framework is given by equation (2):

In which, T_i^{Start} denotes the first year in which province i initiated a WRT pilot, and the dummy variable $1\{t- T_i^{Start} =\tau\}$ equals 1 if year t is τ periods away from the adoption year, and 0 otherwise. The coefficients δ_τ thus capture the dynamic evolution of treatment effects in event time, where $\tau=-1$ serves as the reference period and is omitted from the regression. All other variable definitions remain consistent with those used in the baseline model.

Figure 3 presents the event-study estimates used to assess the plausibility of the parallel-trend assumption and to illustrate the dynamic effects of WRT pilots on the outcome variables. For water-use efficiency, as shown in panels (a) and (b), the coefficients on pre-treatment leads are near zero and statistically insignificant, suggesting no systematic differences in efficiency trends between treated and untreated provinces prior to policy adoption. This pattern provides supportive evidence for the validity of the DID framework. Following the introduction of WRT, the estimated coefficients turn positive and show a steady increase in magnitude. Notably, efficiency begins to rise in the first policy year, and the log specification in panel (b) reveals a similar upward trajectory, with post-treatment effects becoming statistically distinguishable from zero. These dynamic patterns reinforce the baseline findings and indicate that WRT adoption contributed to sustained improvements in provincial water-use efficiency over time.

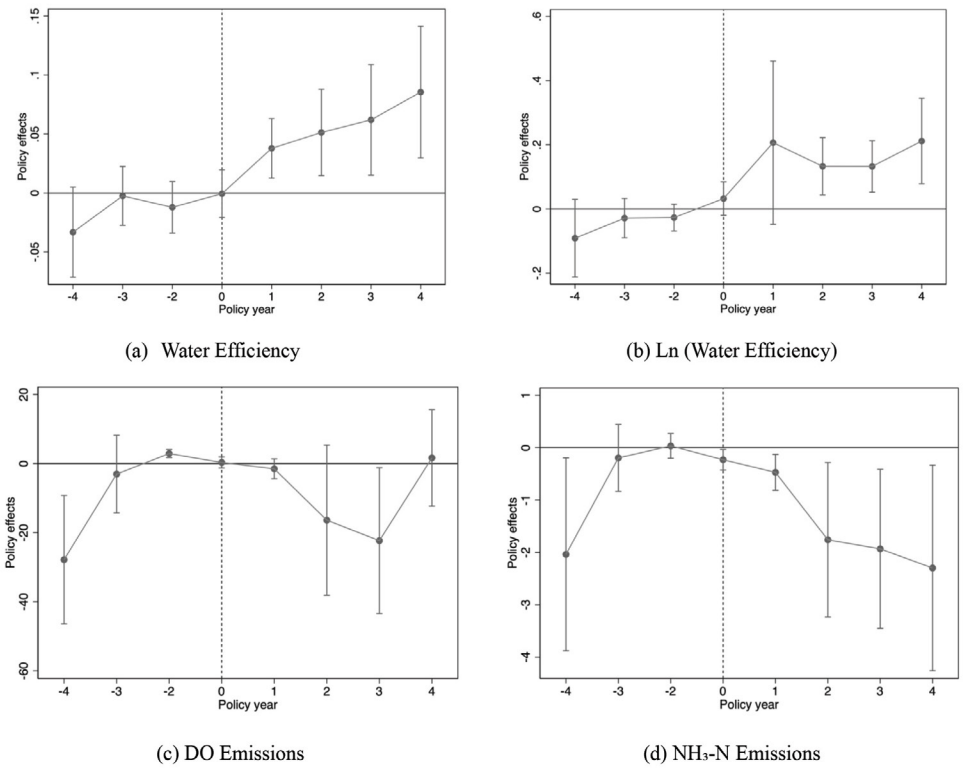


Figure 3. Parallel Trend Tests for Policy Effects

The dynamic patterns for water quality are comparatively inconclusive. As shown in panel (c), DO emissions do not exhibit significant differences during the pre-treatment period, yet the post-treatment coefficients vary considerably and are accompanied by wide confidence intervals. A similar pattern is observed for NH_3-N in panel (d). This degree of variability suggests that while WRT may have had some influence on water quality, its observable effects are relatively modest and less statistically robust compared to the more consistent improvements in water-use efficiency.

4.1.3 DID Robustness Check

To address potential concerns about sample selection bias, we complement the baseline DID specification with a propensity score matching (PSM) procedure combined with DID estimation. Specifically, provinces implementing WRT pilots (treatment group) are matched to control provinces based on their pre-treatment characteristics, including all controls from the baseline model, as well as lagged values and trends of the outcome variables. Kernel matching is applied to construct weighted control groups that closely approximate the pre-policy profiles of treated provinces. After matching, DID regressions are re-estimated on the matched sample, both without and with kernel weights.

The results are presented in Table 3. In line with the baseline findings, WRT adoption remains positively associated with improvements in water-use efficiency. In columns (1) and (2), the estimated coefficients for efficiency levels are 0.083 and 0.082, both statistically significant at the 5% level. The log specification in columns (3) and (4) yields similarly positive and significant effects, with estimated coefficients of 0.261 and 0.233, corresponding to an approximate 26-29% increase in efficiency compared to the counterfactual. These estimates reaffirm the robustness of the efficiency gains observed in the main analysis.

For quality outcomes, the evidence remains less definitive. As shown in columns (5) and (6), the estimated coefficients for DO emissions are positive and significant at the 5% level in the unweighted specification. However, the estimates become less precise in the weighted model. Consistent with the baseline analysis, the effects on NH_3-N emissions are not statistically significant; for brevity, the detailed estimates are not reported here.

4.1.4 DID Placebo Test

To further examine the robustness of our baseline findings, we conducted a placebo test. The logic of this test is to repeatedly reassign the WRT treatment status randomly across provinces and re-estimate the DID specification, thereby generating an empirical distribution of placebo coefficients under the null hypothesis. If the estimated treatment effect from the actual data falls in the extreme tail of this simulated distribution, it strengthens the inference that the observed result is unlikely to be due to chance or spurious correlations.

Table 3. DID Robustness Check: PSM-DID Methods

VARIABLES	(1)[a]	(2)[b]	(3)[a]	(4)[b]	(5)[a]	(6)[b]
	Water Efficiency		Ln (Water Efficiency)		DO Emissions	
WRT × Post	0.083**	0.082**	0.261**	0.233**	14.298**	9.848
	(0.030)	(0.039)	(0.111)	(0.112)	(5.740)	(5.804)
Control variables	YES	YES	YES	YES	YES	YES
Province-fixed effects	YES	YES	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES	YES	YES
Constant	2.223***	3.219***	0.651	3.153	-24.642	147.164
	(0.764)	(0.906)	(2.843)	(1.866)	(204.684)	(291.190)
Observations	408	408	408	408	456	456
Adjusted R-squared	0.932	0.922	0.732	0.707	0.838	0.862

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. [a] PSM-DID with control variables on the kernel-matched sample (unweighted); [b] PSM-DID with control variables on the kernel-matched sample (kernel-weighted). To conserve space, coefficients for the control variables are omitted. "YES" indicates inclusion of province and year fixed effects and the full set of controls; the same convention applies to the other tables.

Figure 4 plots the distribution of estimated coefficients from 500 placebo replications for the two water-use efficiency outcomes. In both panels, the placebo estimates cluster closely around zero, while the actual treatment effect (marked by the dashed line) lies well outside the central mass of the simulated distribution. This pattern provides evidence that the observed efficiency improvements in the baseline analysis are unlikely to be driven by random assignment, reinforcing the credibility of the causal interpretation. By contrast, we do not extend the placebo analysis to the water quality outcomes, as the previous estimates for DO and NH_3-N emissions were found unstable and imprecise.

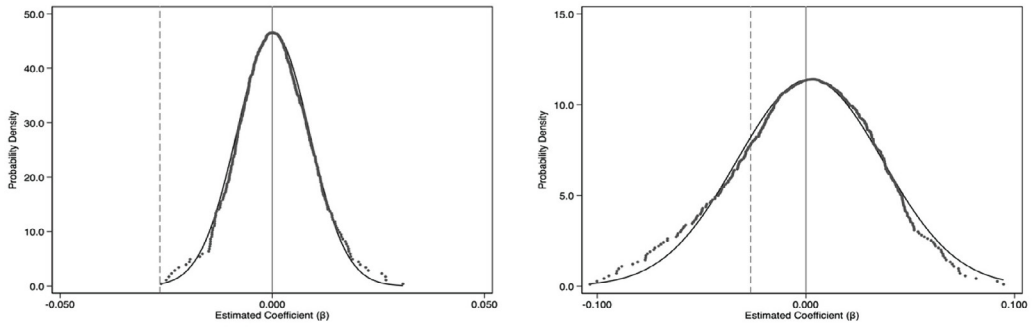


Figure 4. Distribution of Estimated Coefficients

4.2 SCM Analysis

4.2.1 Baseline Results

The preceding DID and PSM-DID analyses yielded unstable and imprecise estimates for water quality outcomes. In particular, the estimated effects on DO and NH_3-N emissions were inconsistent across model specifications, characterized by wide standard errors and limited evidence of parallel pre-trends. These limitations suggest that the DID framework may not adequately capture the treatment effects for environmental outcomes. To address this concern, we apply the SCM analysis to conduct province-level case studies. The SCM approach constructs a weighted combination of untreated provinces that closely approximates the pre-treatment trajectory of a treated province, thereby generating a more credible counterfactual for post-treatment comparison.

Figure 5 presents the results for five pilot provinces where SCM produced valid synthetic controls. For DO emissions, the pre-treatment of the treated province closely match those of their synthetic counterparts in all five cases, lending credibility to the constructed counterfactuals. Notably, Hubei and Gansu exhibit large and sustained improvements in DO levels relative to their synthetic controls. Jiangxi shows a sharp increase immediately following policy implementation, maintaining a persistent lead thereafter. Ningxia records a modest but steady improvement beginning in 2016. In contrast, Shaanxi experiences short-run gains that gradually diminish and converge with the synthetic control by 2016.

In contrast, following WRT adoption, both Gansu and Ningxia show substantial and sustained declines in NH_3-N emissions relative to their synthetic controls, with the gaps continuing to widen through 2020. Hubei experiences a sharp drop around 2016 and thereafter remains slightly below its synthetic counterpart, suggesting a modest improvement. Jiangxi records a decline after 2015 but largely follows its synthetic control, offering limited evidence of treatment effects. Shaanxi, which implemented the policy in 2010, shows an initial rise in emissions followed by convergence and ending slightly below the synthetic control.

In the remaining five pilot provinces, SCM either failed to yield a credible synthetic counterfactual—due to poor pre-treatment fit or unstable donor weights—or produced no consistent post-adoption improvement in either DO or NH_3-N. To conserve space, these cases are not presented. Taken together, the SCM evidence suggests that WRT pilots led to improvements in water quality in a subset of provinces, partially supporting H3.

4.2.2 SCM Robustness Check

To further test robustness, we evaluate the quality of each synthetic control by comparing the root mean squared prediction error (RMSPE) before and after policy adoption. Specifically, we use the post/pre RMSPE ratio to indicate the degree of post-policy divergence relative to pre-treatment fit noise. Ratios close to 1 suggest minimal treatment effect, while larger ratios indicate more

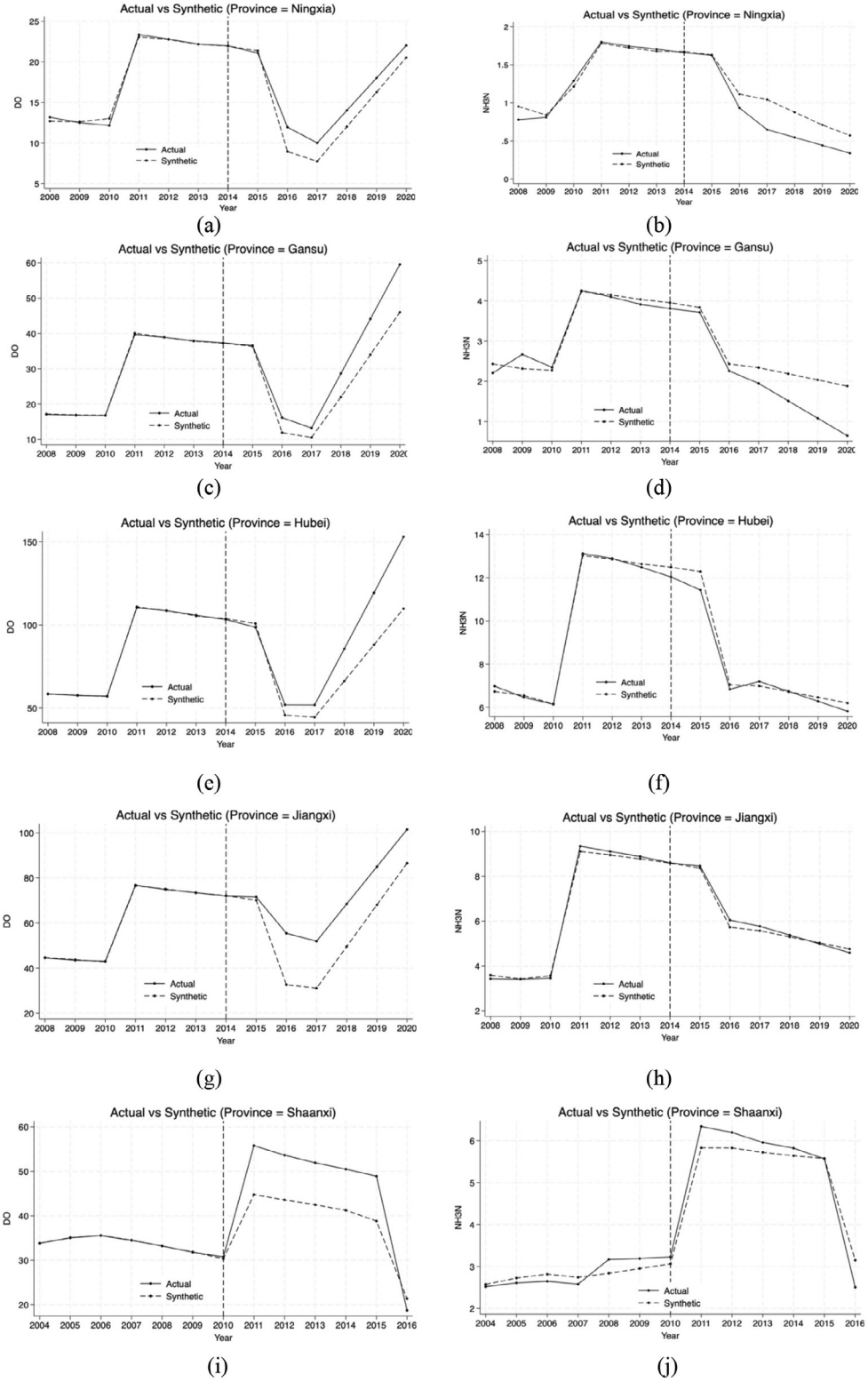


Figure 5. Comparison of Actual and Synthetic Trends for DO and NH_3-N Emissions

substantive impacts. Table 4 presents province-level diagnostics. For DO emissions, the largest effects are observed in Shaanxi, Hubei, Jiangxi, and Gansu; Inner Mongolia and Ningxia show moderate responses, while other pilot provinces exhibit little change. For NH_3-N emissions, pronounced effects are concentrated in Hebei, Henan, and Shandong, with more modest improvements in Gansu, Hubei, and Ningxia, and limited divergence elsewhere.

Table 4. SCM Robustness Check: Pre-/Post-treatment RMSPE and RMSPE Ratio

Province	DO Emission			NH_3-N Emission		
	pre_ RMSPE	post_ RMSPE	RMSPE_ ratio	pre_ RMSPE	post_ RMSPE	RMSPE_ ratio
Hebei	2.009	4.997	2.487	0.113	0.999	8.814
Inner Mongolia	1.168	7.378	6.315	0.320	0.480	1.500
Jiangxi	0.226	16.132	71.512	0.147	0.162	1.102
Shandong	14.855	16.600	1.117	0.180	1.139	6.315
Henan	1.588	0.812	0.512	0.277	1.899	6.855
Hubei	0.248	21.779	87.837	0.130	0.414	3.185
Guangdong	23.233	33.139	1.426	2.378	3.919	1.648
Shaanxi	0.041	8.502	208.609	0.199	0.364	1.831
Gansu	0.190	7.126	37.433	0.181	0.666	3.683
Ningxia	0.421	1.832	4.347	0.080	0.246	3.090

Further, to benchmark the magnitude of each SCM effect against a credible counterfactual, we conduct placebo-in-space tests. For each treated province (referred to as the anchor), we keep its actual adoption year and re-estimate SCM by alternately assigning "pseudo-treatment" to each untreated province. This procedure generates a distribution of post-/pre- RMSPE ratios under the null hypothesis of no treatment effect. The anchor province's actual ratio is then compared against this placebo distribution to calculate a pseudo p-value, along with its position relative to the placebo median (P50) and 95th percentile (P95).

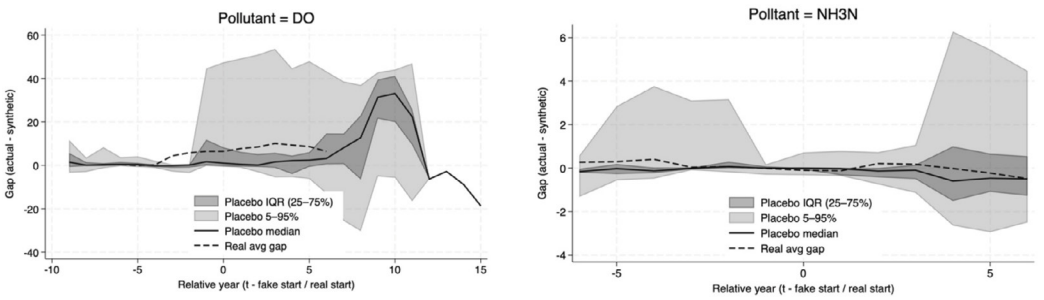
Table 5 shows that, for DO emissions, the post/pre-RMSPE ratios in Jiangxi, Hubei, Shaanxi, and Gansu are highly extreme relative to their placebo distributions ($p\approx0$), suggesting strong treatment effects. Inner Mongolia's ratio approaches the 5% significance threshold, while the remaining pilots show no discernible divergence from their placebo counterparts. For NH_3-N emissions, pronounced effects are observed in Hebei, Henan, and Shandong ($p\approx0$),

with significant results at the 5% level in Gansu, Hubei, and Ningxia. Other provinces show no notable divergence. These placebo benchmarks align with the SCM plots and reinforce the conclusion that water-quality improvements exist but are heterogeneous across provinces.

Table 5. SCM Robustness Check: Placebo-in-Space Tests (Nplacebo = 21)

Provinces	NO Emission				NH_3-N Emission			
	Treated_ ratio	P50	P95	P_ value	Treated_ ratio	P50	P95	P_ value
Hebei	2.487	2.117	5.156	0.476	8.814	0.965	3.040	0.000
Inner Mongolia	6.315	2.117	5.156	0.048	1.500	0.965	3.040	0.333
Jiangxi	71.512	2.117	5.156	0.000	1.102	0.965	3.040	0.429
Shandong	1.117	2.117	5.156	0.667	6.315	0.965	3.040	0.000
Henan	0.512	2.117	5.156	0.810	6.855	0.965	3.040	0.000
Hubei	87.837	2.117	5.156	0.000	3.185	0.965	3.040	0.048
Guangdong	1.426	2.117	5.156	0.571	1.648	0.965	3.040	0.333
Shaanxi	208.609	5.670	17.531	0.000	1.831	1.98	9.037	0.619
Gansu	37.433	2.117	5.156	0.000	3.683	0.965	3.040	0.048
Ningxia	4.347	2.117	5.156	0.143	3.090	0.965	3.040	0.048

To further probe robustness against concerns of spurious timing, we implement a placebo-in-time analysis within the SCM framework. For each treated province, we re-estimate SCM using a falsified adoption year set just prior to the actual policy start. We then aggregate the resulting placebo gaps across provinces to generate percentile bands—specifically, the median, interquartile, and 5^{th}–95^{th} percentiles. The actual average treatment gap is plotted against these placebo envelopes to assess its deviation from expected random fluctuations. As demonstrated in Figure 6, for DO emissions, the placebo gaps center near zero in the pre-treatment period, while the observed post-policy gap rises above the interquartile range and approaches the upper bound of the placebo envelope in provinces with strong SCM signals. This suggest that the observed effects are unlikely to be artifacts of timing. For NH_3-N emissions, the average gap remains near zero before adoption and declines modestly afterward, dipping toward the lower quantiles around years 3-5 post-treatment. This pattern suggests moderate average reductions, albeit with underlying heterogeneity across provinces.



(a) (b)

Figure 6. SCM Robustness Check: Placebo-in-Time Test

4.3 Heterogeneity Analysis

4.3.1 Heterogeneity Analysis by Geographic Location

While the main analysis centers on the average causal effects of WRT, we also include exploratory heterogeneity analyses to assess whether the estimated effects on water-use efficiency vary across different geographic and market contexts. These analyses are not derived from pre-specified theoretical hypotheses; rather, they serve as supplementary evidence to enrich the interpretation of the baseline results. We begin by examining geographic heterogeneity in the efficiency effects of WRT. Specifically, we re-estimate the DID models based on two commonly used spatial groupings in Chinese policy analysis—East vs. Central (the West omitted because of a lack of treated units) and North vs. South.

The results indicate that the efficiency improvements are more pronounced in the Central and Northern subsamples. In levels, the estimated treatment effects are 0.073 for Central and 0.092 for North, both significant at the 10% level. Although the point estimates for East (0.094) and South (0.038) are also positive, they are statistically insignificant. In log specifications, the coefficients are 0.124 for Central and 0.399 for North, corresponding to approximate improvements of 13.2% and 49.0%, respectively. The South shows a smaller but statistically significant effect of 9.1% (0.087), while East 0.144 remains statistically insignificant.

4.3.2 Heterogeneity Analysis by Marketization Level

To further assess whether the efficiency gains depend on market institutions, we extend the DID model by interacting the treatment variable with an indicator for provinces exhibiting high levels of marketization. This indicator is constructed by following Yang and Zeng (2012). For our study, the coefficient on interaction term identifies the additional effect in provinces with higher marketization levels. All regressions include the baseline set of controls and fixed effects for province and year, with standard errors clustered at the provincial level.

Results reported in Table 7 show that the efficiency effects of WRT are considerably stronger in provinces with higher levels of marketization. In the

level specification, the interaction term is estimated at 0.085 ($p < 0.05$). In the log specification, the coefficient rises to 0.227 ($p < 0.01$), implying an efficiency gain of approximately 25.5% ($(e^{0.227}-1) \times 100$). Overall, these results suggest that more developed market institutions can significantly amplify the efficiency improvements brought about by WRT policy.

Table 6. Heterogeneity Analysis: East–Central and North–South Comparisons

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Water Efficiency				Ln (Water Efficiency)			
	East	Central	North	South	East	Central	North	South
WRT × Post	0.094	0.073*	0.092*	0.038	0.144	0.124*	0.399*	0.087*
	(0.072)	(0.029)	(0.049)	(0.022)	(0.100)	(0.051)	(0.217)	(0.045)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Province-fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Constant	0.544	3.912*	1.140	1.925	-0.678	4.929	-0.139	2.640
	(1.207)	(1.571)	(0.960)	(1.324)	(1.798)	(2.546)	(2.900)	(2.793)
Observations	136	102	238	238	136	102	238	238
Adjusted R-squared	0.917	0.682	0.913	0.932	0.916	0.749	0.762	0.903

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Heterogeneity Analysis by Marketization Level

VARIABLES	(1)	(2)
	Water Efficiency	Ln (Water Efficiency)
WRT × Post	0.031	0.101
	(0.021)	(0.071)
High_Marketization	-0.045*	-0.207*
	(0.024)	(0.112)
(WRT × Post)× High_Marketization	0.085**	0.227***
	(0.034)	(0.079)
Control variables	YES	YES
Province-fixed effects	YES	YES
Year-fixed effects	YES	YES
Constant	1.450**	-0.590
	(0.633)	(2.761)
Observations	493	493
Adjusted R-squared	0.915	0.745

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5. Mechanism Analysis

5.1 Water-use Structure

To investigate whether WRT influences water-use efficiency via changing the water allocation patterns, we construct a set of indicators reflecting the provincial water-use structure. Annual data on sectoral water withdrawals are drawn from the EPS China Macroeconomic Database. For each province-year observation, total freshwater withdrawals W_{it} are disaggregated into agricultural A_{it} and industrial I_{it} uses. The rest components, defined as $O_{it} = I_{it} - I_{it} - I_{it}$, primarily reflects residential and ecological water use. Based on these categories, we calculate the sectoral shares of water use across provinces and years:

$$s_{it}^{\text{ag}} = \frac{A_{it}}{W_{it}},\ s_{it}^{\text{ind}} = \frac{I_{it}}{W_{it}},\ s_{it}^{\text{oth}} = \frac{W_{it}-A_{it}-I_{it}}{W_{it}},\ s_{it}^{\text{ag}} + s_{it}^{\text{ind}} + s_{it}^{\text{oth}} = 1, \tag{3}$$

To address measurement noise, we set $O_{it} = 0$ when the residual is slightly negative due to rounding errors, we exclude observations where total freshwater withdrawal $W_{it} \leq 0$, and then renormalize the sectoral shares to ensure they sum to 1. Based on these adjusted values, we calculate the Herfindahl–Hirschman Index (HHI) to capture the concentration of water use across sectors:

$$\text{HHI}_{\text{it}} = \left(s_{it}^{\text{ag}}\right)^2 + \left(s_{it}^{\text{ind}}\right)^2 + \left(s_{it}^{\text{oth}}\right)^2 \in [1/3,\ 1], \tag{4}$$

with $\text{HHI} \in [1/3, 1]$ in a three-sector partition. Higher HHI values indicate a more one-sided structure (greater reliance on a single sector). We then measure diversification using normalized Shannon entropy:

$$H_{it} = -\sum_{k\in\{\text{ag,ind,oth}\}} s_{it}^{k} \ln s_{it}^{k},\ \text{Shannon}_{\text{it}} = H_{it}/\ln 3 \in [0,1], \tag{5}$$

By convention $0 \ln 0 \equiv 0$; in implementation we handle zero shares accordingly. Higher values of Shannon index reflect more balanced water use across agriculture, industry, and other uses. As expected, Shannon and HHI move in opposite directions.

Using these measures, Table 8 presents the DID estimates of WRT's impact on water-use structure. For the HHI, the coefficient on *WRT* × *Post* interaction term is negative and statistically significant in both specifications: –0.053 without controls and –0.042 with controls. In contrast, the coefficients for the Shannon index are positive and significant, at 0.068 and 0.053, respectively. These results indicate that WRT pilots reduce concentration by approximately 4-5 percentage points on the normalized 0-1 HHI scale, while increasing water-use diversification by roughly 5 to 7 percentage points on the 0-1 Shannon scale. Taken together, these findings lend support to H2.

Table 8. The Impacts of WRT Pilots on Water-use Structure

VARIABLES	(1)	(2)	(3)	(4)
	Water-use Structure			
	HHI		Shannon	
WRT × Post	-0.053**	-0.042**	0.068**	0.053**
	(0.022)	(0.017)	(0.028)	(0.021)
Control variables		YES		YES
Province-fixed effects	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Constant	0.531***	0.973**	0.739***	-0.028
	(0.004)	(0.417)	(0.005)	(0.507)
Observations	609	609	609	609
Adjusted R-squared	0.881	0.926	0.887	0.934

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5.2 Water Governance Intensity

To explore the mechanism through which WRT contributes to improvements in water environmental quality, we focus on the intensity of water governance. Specifically, we construct two measures to capture this dimension. The first is annual capital investment in industrial wastewater treatment facilities, drawn from the EPS Macroeconomic Database, which reflects the extent to which provinces prioritize infrastructure expansion for pollution control. The second is annual operating expenditure on wastewater treatment facilities, obtained from the EPS Environmental Database, which captures ongoing financial commitments to the operation and maintenance of pollution control systems.

Table 9 reports the results of the mechanism analysis examining how WRT policy influences water environmental quality through strengthened water governance. Across model specifications, the coefficient on the interaction term *WRT* × *Post* is consistently positive and statistically significant. Specifically, WRT pilot implementation is associated with increased capital investment in industrial wastewater treatment facilities. The estimated coefficients for investment are 0.465 without controls and 0.497 with controls, both statistically significant. Similarly, WRT pilots are linked to higher operating expenditures on wastewater treatment, with statistically significant coefficients of 0.334 and 0.328 across specifications.

These results suggest that the implementation of WRT prompts provincial governments to strengthen water pollution control efforts, both by expanding capital investment in wastewater treatment infrastructure and by increasing recurrent operating expenditures to sustain facility operations. Accordingly, the findings provide empirical support for H4**.**

Table 9. Mechanism Analysis: Water Governance Intensity

VARIABLES	(1)	(2)	(3)	(4)
	Water Governance			
	Ln (Industrial Wastewater Treatment Investment)		Ln (Operating Expenditure on Wastewater Treatment)	
WRT × Post	0.465*	0.497*	0.334**	0.328**
	(0.268)	(0.244)	(0.132)	(0.127)
Control variables		YES		YES
Province-fixed effects	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Constant	9.567***	-4.012	11.615***	9.244***
	(0.047)	(4.248)	(0.036)	(2.909)
Observations	598	598	377	377
Adjusted R-squared	0.677	0.686	0.958	0.961

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

6. Discussion and Conclusions

This study set out to evaluate whether China's WRT pilots—launched through a combination of central mandates and local initiatives—have improved water-use efficiency and water environmental quality, and to explore the mechanisms behind any observed effects. The analysis is motivated by the recognition that both scarcity and pollution jointly determine water-related welfare outcomes (Ma et al. 2020), and by a growing body of literature that conceptualizes water rights as multi-dimensional entitlements integrating both quantity and quality dimensions (Martinsen et al. 2019; T. Wang et al. 2022; Z. Wang et al. 2020; Ward and Pulido-Velazquez 2008). Drawing on an extended provincial panel dataset, we employed a DID strategy with event-study diagnostics, supplemented by province-specific SCM analyses. The results reveal that China's WRT pilots have led to notable improvements in both water-use efficiency and water quality. However, these effects are not uniform; rather, they vary across subnational contexts and marketization settings.

In particular, the efficiency results are consistent with the theoretical rationale behind tradable water rights. When withdrawal entitlements are clearly defined, transferable, and enforceable, water prices reveal marginal values, facilitating reallocation from lower- to higher-productivity uses and encouraging both conservation efforts and technological upgrading (Chong and Sunding 2006; Rosegrant and Binswanger 1994; Vaux Jr. and Howitt 1984). Our estimates provide empirical

support for H1, indicating that these allocative mechanisms are functioning in practice. In contrast, the environmental outcomes reflect the conditional logic embedded in two-dimensional WRT frameworks. Our mixed findings suggest that WRT can indeed enhance water quality, but the effects are uneven. This pattern resonates with prior evidence indicating that agricultural non-point-source pollution and basin-specific constraints often limited water usability, implying that environmental co-benefits depend critically on the pricing or regulation of runoff and the credibility of enforcement mechanisms (Dabrowski et al. 2009; Grantham and Viers 2014).

Heterogeneity in efficiency effects also yields meaningful insights. We observe more pronounced improvements in the Central and Northern subsamples, as well as in provinces with higher levels of marketization. In contrast, in coastal or more economically diversified areas, the marginal effects of WRT on measured efficiency appear attenuated—potentially due to the availability of alternative water-saving strategies or the presence of pre-existing governance mechanisms.

Furthermore, our mechanism analyses provide a complementary perspective. The findings suggest that water-use efficiency improvements are primarily realized through optimization of water-use structure, with WRT reallocating water from agriculture toward higher-value industrial and other uses. In comparison, improvement in water quality is mainly associated with strengthened governance efforts, as indicated by increased capital investment and recurrent expenditures on wastewater treatment facilities.

Theoretically, these findings contribute to an institutional understanding of water markets. The analysis substantiates the claim that the object of exchange in WRT is inherently composite—encompassing both quantity and quality—and that policy performance should be evaluated along a joint efficiency–environment frontier, rather than on a single dimension (Martinsen et al. 2019; Z. Wang et al. 2020). Moreover, this study suggest that distributional and ecological safeguards—central to ongoing debates in water governance—can be compatible with, and in some cases even strengthened by, well-designed trading institutions, provided that enforcement mechanisms, monitoring systems, and third-party protections are credible (David and Hughes 2024; Whitford and Clark 2007).

Policy implications follow directly from the findings. To enhance the credibility of entitlements, provinces should strengthen registry systems and metering infrastructure and expand market platforms in areas where trading activity remains limited. Most importantly, jurisdictions need to implement two-dimensional designs by linking withdrawal rights to discharge permits and ambient environmental targets. This requires real-time adjustments backed by enforceable penalties, along with clearly defined compliance responsibilities for return flows. Given

that nonpoint source pollution often undermines water usability, trading rules should be complemented with instruments that price or cap agricultural runoff, as well as with targeted ecological replenishment measures to maintain instream flows. Considering the observed heterogeneity, policy design should be tailored to local conditions. Provinces in central and northern regions—where water scarcity is more severe and marketization more advanced—may be particularly well-positioned to scale up trading mechanisms. In contrast, coastal and southern provinces might instead focus on tightening water-quality regulations, enhancing monitoring capacity, and aligning market expansion with pollution-abatement capabilities.

Several limitations of this study should be acknowledged. First, the analysis is conducted at the provincial level rather than at hydrologically consistent basin scales, which limits the ability to capture intra-basin water reallocations or spillovers. Future research utilizing watershed-level data could offer a more precise assessment. Second, while event-study diagnostics show balanced pre-trends for water-use efficiency, the less stable pre-trends for water quality outcomes raise concerns about potential policy endogeneity or reverse causality. Although our use of province-level SCM analysis helps to address this, it does not fully resolve this issue. Third, the staggered rollout of WRT pilots may coincide with other policy reforms. While we attempt to isolate cases with clear institutionalization and exclude provinces with major overlaps, some residual policy noise may remain. Finally, while we identify two broad mechanisms at the province level, we lack sector- or plant-level outcome data. Micro-level datasets would allow for a more detailed tracing of heterogeneous impacts and a clearer identification of specific mechanisms.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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From Fragmentation to Synergy: Financial Policy Coordination in the Western Greater Bay Area

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Abstract

The Guangdong–Hong Kong–Macao Greater Bay Area (GBA) is a strategic initiative of the Chinese government aimed at enhancing global competitiveness through innovation. Yet, pronounced economic disparities in the western GBA—encompassing Macao, Zhuhai, Zhongshan, and Jiangmen—continue to hinder the region's balanced development. This study examines the state of policy coordination in the western GBA's financial sector, identifying key challenges and proposing strategies to strengthen policy formulation, implementation, and evaluation. Adopting a mixed-methods design, the research integrates Institutional Collective Action (ICA) theory and policy instrument theory within a "policy instrument–innovation value chain" framework. Drawing on a content analysis of 44 policy documents (494 instances of policy instruments) and 29 in-depth interviews, the study reveals the complexities of policy coordination across multiple levels of government. The findings underscore the differentiated roles of supply-side, environment-side, and demand-side policy instruments at various stages of the innovation value chain, highlighting the interconnections between policy directives and regional development objectives. By applying quantitative content analysis to the financial policies of the western GBA, this research advances the literature with a nuanced account of the mechanisms shaping coordinated industrial development in the region.

Keywords: Policy Coordination; Policy Instruments; Institutional Collective Action; Financial Industry; Western Greater Bay Area

De la fragmentación a la sinergia: coordinación de políticas financieras en el área occidental de la Gran Bahía

Resumen

El Área de la Gran Bahía de Guangdong-Hong Kong-Macao (GBA) es una iniciativa estratégica del gobierno chino destinada a mejorar la competitividad global mediante la innovación. Sin embargo, las pronunciadas disparidades económicas en la GBA occidental —que abarca Macao, Zhuhai, Zhongshan y Jiangmen— siguen

obstaculizando el desarrollo equilibrado de la región. Este estudio examina el estado de la coordinación de políticas en el sector financiero de la GBA occidental, identificando los principales desafíos y proponiendo estrategias para fortalecer la formulación, implementación y evaluación de políticas. Adoptando un diseño de métodos mixtos, la investigación integra la teoría de la Acción Colectiva Institucional (ACI) y la teoría de los instrumentos de política dentro de un marco de "cadena de valor de la innovación en instrumentos de política". A partir de un análisis de contenido de 44 documentos de política (494 ejemplos de instrumentos de política) y 29 entrevistas en profundidad, el estudio revela las complejidades de la coordinación de políticas en múltiples niveles de gobierno. Los hallazgos subrayan las funciones diferenciadas de los instrumentos de política de oferta, medio ambiente y demanda en las distintas etapas de la cadena de valor de la innovación, destacando las interconexiones entre las directrices políticas y los objetivos de desarrollo regional. Al aplicar el análisis de contenido cuantitativo a las políticas financieras del oeste del Área de la Bahía (GBA), esta investigación aporta un análisis detallado de los mecanismos que configuran el desarrollo industrial coordinado en la región.

Palabras clave: Coordinación de políticas; Instrumentos de política; Acción colectiva institucional; Industria financiera; Oeste del Área de la Bahía (GBA)

破界融通：粤港澳大湾区西部金融政策协同的国家战略升维

摘要

粤港澳大湾区建设是国家立足新发展阶段、贯彻新发展理念、服务构建新发展格局的重大战略擘画，旨在以创新为根本驱动力，全面提升区域在全球经济治理格局中的战略位势与核心竞争力。但粤港澳大湾区西部（涵盖澳门特别行政区、珠海、中山、江门等城市）与大湾区东部之间结构性经济失衡问题依然突出，已成为制约大湾区东西部区域一体化高质量发展、阻碍国家战略目标纵深推进的关键瓶颈。本研究立足国家区域协调发展战略全局，聚焦西部湾区金融领域政策协同的深层机制，系统诊断多层级治理中的制度梗阻，创新性构建“政策工具 — 创新价值链”整合分析框架，有机融合制度性集体行动（ICA）理论与政策工具理论。通过严谨的混合研究方法，对 44 份权威政策文本（萃取 494 项政策工具实例）实施量化内容分析，并辅以 29 场政产学研专家深度访谈，首次揭示多级政府间政策协调的动态耦合机

理。研究发现：供应面、环境面与需求面政策工具在创新价值链各环节呈现非对称性效能分布，凸显了政策指令与区域发展目标间的深层互构关系。本成果不仅突破了传统政策研究的碎片化局限，更从理论层面为新时代国家治理现代化提供了创新性范式支撑，从实践维度为破解区域发展不平衡不充分问题、打造世界级湾区增长极贡献了战略性路径指引。

关键词：政策协调；政策工具；制度性集体行动；金融行业；粤港澳大湾区西部

Introduction

The Guangdong–Hong Kong–Macao Greater Bay Area (GBA) was officially established as a national strategic initiative by the Central Committee of the Communist Party of China and the State Council in 2019. Bringing together Hong Kong and Macao Special Administrative Regions alongside nine municipalities in Guangdong Province, the GBA aspires to become a globally competitive bay area powered by innovation and integration.

Notably, the western GBA, composed of Macao, Zhuhai, Zhongshan, and Jiangmen, can be regarded not only as a sub - regional area that lags behind the central and eastern zones in terms of economic development, but also as a "living laboratory" for testing institutional coordination under the "One Country, Two Systems" principle. This unique characteristic makes it an ideal case for studying policy coordination, especially in the context of the diverse political, economic, and legal systems coexisting within the region. Despite the GBA's ambitious vision, stark economic disparities persist within the region with the western GBA lagging behind, which constrains the balanced development that the strategy seeks to achieve.

Against this backdrop, pressing questions arise: What is the current state of policy coordination in the western GBA's modern financial industry? What obstacles undermine coordination efforts? And what targeted measures could enhance the formulation, implementation, and evaluation of financial policies in this subregion? The focus on financial policy coordination is crucial because the financial sector plays a vital role in driving economic development and integration in the region. Effective financial policy coordination can help allocate resources more efficiently, promote innovation, and reduce the economic disparities within the GBA.

The challenge of coordination is hardly unique to the GBA. A substantial body of scholarship has examined cross-sectoral policy coordination and integration, most often through case studies (Trein et al., 2019) and surveys (e.g., Bowman and Parsons, 2013). While these approaches have generated valuable insights, their limitations underscore the need for more diverse methodologies capable of enhancing comparability and external validity. Without such approaches, it remains difficult to answer broader questions about what works, under which conditions, and why—questions that are

crucial for both theory and practice (Trein et al., 2021). Recent studies further emphasize the importance of cross-sectional and longitudinal analyses to compare coordination across sectors (Duit, 2016) and over time (Trein and Maggetti, 2020). Moreover, the increasing complexity of policy regimes, coupled with policy accumulation, only compounds the challenges of coordination (Adam et al., 2018; Bolognesi and Nahrath, 2020).

To address these gaps, this study develops a two-dimensional analytical framework that combines institutional collective action (ICA) theory and policy instrument theory within the lens of a "policy instrument–innovation value chain." This framework provides a structured means of analyzing the dynamics of financial policy coordination in the western GBA, illuminating the interplay among different levels of government and their respective policy instruments. Methodologically, the research draws on a content analysis of 44 policy documents (comprising 494 coded instances of policy instruments) and 29 in-depth interviews. This mixed-methods approach enables a nuanced assessment of policy design, implementation, and evaluation, as well as the tensions and complementarities across supply-side, environment-side, and demand-side instruments.

The findings offer both theoretical and practical contributions. For policymakers and stakeholders, they provide evidence-based insights into how coordinated industrial development might be achieved in the western GBA. For scholars, they advance the literature by demonstrating how policy instrument theory and quantitative content analysis can be fruitfully applied to dissect complex, multi-level policy environments. By systematically analyzing policy texts, it becomes possible to identify not only the intentions of policymakers and the interconnections among policies, but also the degree to which financial strategies align with regional development goals. In doing so, this study sheds new light on the mechanisms driving—or impeding—policy coordination in one of China's most ambitious regional integration projects. The insights gained from this study can also be generalized to other multi-level governance systems, as they highlight the common challenges and potential solutions in policy coordination across different administrative levels and sectors.

Literature Review

Understanding the dynamics of policy coordination in the western Guangdong-Hong Kong-Macao Greater Bay Area requires a solid theoretical foundation that can account for both the institutional complexities of regional collaboration and the practical mechanisms through which policies take effect. Financial integration in the GBA is not merely a matter of economic planning; it is shaped by intergovernmental relations, regulatory diversity, and the instruments through which governments attempt to guide industrial development. As such, this study draws upon two complementary strands of theory.

Institutional Collective Action Theory

Institutional Collective Action (ICA) theory, proposed by Richard C. Feiock, integrates Olson's collective action theory (Olson 1971) to analyze the driving factors, dilemmas, and selection mechanisms of cooperation in regional collective action. ICA theory posits that multiple administrative entities engage in a dynamic process of coordination, collaboration, and agreement formation due to common goals and interests, which is termed institutional collective action. This process also encounters corresponding collective action dilemmas (Feiock and Scholz 2009; Suo 2020). Among these, the benefits of cooperation are a critical driving factor for the formation of collective action, which are categorized into collective benefits and selective benefits. Recent studies on multi-level governance (MLG) further enrich this framework by emphasizing the dispersion of authority across supranational, national, regional, and local levels (Hooghe and Marks 2001). MLG typologies (Type I vs. Type II governance) reveal distinct structural logics of efficiency and adaptability in collaborative systems (Hooghe and Marks 2003). Additionally, collaborative governance research (Ansell and Gash 2008) complements ICA by proposing a contingency model (initial conditions-leadership-institutional design) to explain critical variables for successful cooperation.

However, as a framework developed within Western political and economic contexts, ICA faces challenges when applied to China's collaborative governance dilemmas (Wang and Wang 2023). The core issue lies in China's unique institutional environment, where regional collaboration is often driven by top-down directives rather than spontaneous horizontal agreements. Recent research on vertical ICA in China offers important refinements to this theory. For instance, upper-level governments frequently intervene in local collaborations through mechanisms such as the "River Chief System" (河长制) (Shen and Han 2020) or regional environmental alliances (Suo et al., 2020), effectively reducing transaction costs and mitigating cooperation risks. These studies demonstrate that ICA in China is not solely reliant on horizontal intergovernmental agreements but also involves "embedded" vertical authority to enhance collaborative efficacy (Wang et al., 2023; Suo et al., 2018).

The literature on policy mixes in innovation policy provides another relevant perspective. Innovation outcomes are seldom the product of isolated policy instruments but rather emerge from synergistic combinations of tools such as R&D subsidies, tax incentives, and regulatory adjustments (Flanagan et al., 2011; Kuhlmann 2001). In European innovation policy, for example, policy mixes are designed to foster systemic change through multi-actor collaboration (Edler and Kuhlmann 2003), aligning closely with ICA's focus on motivational and institutional mechanisms. Integrating the policy mix perspective into ICA analysis can illuminate the interplay between instrument selection and collaborative structures in innovation policy.

Although ICA theory has been widely applied in environmental governance, its application to financial industrial policy and regional integration contexts—such as the western Greater Bay Area (GBA)—remains limited. This paper conducts a content analysis of industrial policies in the western GBA to explore how ICA theory, augmented by multi-level governance and policy mix perspectives, can advance understanding of regional collaborative innovation mechanisms.

Policy Instrument Theory

To transition policies from concepts to reality, various policy instruments must be relied upon. Policies are crafted by the government through the design, organization, and application of these instruments, which serve as means to achieve policy objectives (Flanagan 2011). Based on policy objectives and the nature of the instruments, they can be divided into four categories: learning, incentives, persuasion, and capacity building (Schneider and Ingram 1990). Howlett and Ramesh classify policy instruments into three major categories based on the strength of policy intervention: mandatory, mixed, and voluntary (Howlett et al. 1995). Among the various classification methods, the approach by Rothwell and Zegveld (1981) is widely regarded as the most classical and practical. They were among the earliest to introduce policy instruments into industrial policy analysis. According to the different aspects in which policy instruments impact industrial development, they categorize policy instruments into three major types: supply-side, environment-side, and demand-side, with each aspect containing four policy instruments, making a total of twelve instruments.

This classification reduces the complexity of the innovation policy system from the perspective of tools and measures, showcasing significant internal coherence and distinguishability among dimensions. Supply-side policy instruments mainly refer to the government's direct provision of financial, human, and technological resources. Environment-side policy instruments involve the government indirectly influencing the factors of technological development through mechanisms such as tax systems, intellectual property protection, and fair-trade laws. Demand-side policy instruments focus on actively exploring and stabilizing the market for new technology applications, thereby driving technological innovation and new product development, such as through government procurement.

The study of policy instrument theory is not only crucial for explaining the dynamics of policies but also provides significant references for scholars adopting a policy design perspective (Howlett 2019). In fact, it can be strongly argued that a tool-based approach can reveal the nature of policy dynamics more effectively than an input-based approach, helping policymakers make more effective decisions (Capano, Pritoni and Vicentini, 2019). Despite extensive efforts, many fundamental questions remain unknown or under-researched, and several key

elements regarding individual policy instruments and policy mixes require further investigation.

Theoretical Framework

Policy instruments constitute the methods deployed by policymakers and implementers to attain specific policy objectives, serving as fundamental analytical tools for examining industrial policies (Howlett 1991). While these instruments reflect the means of policy implementation, they do not inherently disclose the underlying policy goals. The innovation value chain occupies a central role throughout industrial development stages, linking innovation activities with value creation. Spanning from inception to maturity and eventual decline, it emphasizes professional division of labor and collaboration among diverse participants, thereby accelerating value growth and enhancing innovation efficacy. From initial conception to market promotion, followed by mass production and distribution, each stage represents a distinct value-added segment, offering clear insights into industrial maturation processes. Consequently, this paper analyzes the coordinated development of the modern financial industry across Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen through the value realization process at different innovation value chain stages.

This study categorizes emerging industry development into three phases: technology research and development (R&D), industrialization, and marketization (Liu and Jian 2011). By employing a dual-dimensional "policy instrument-innovation value chain" analytical framework, we examine modern financial industry policies in the aforementioned regions (see Figure 1). This framework elucidates how policy instruments interact with various innovation value chain stages. Crucially, the three policy instrument types—supply-side, environment-side, and demand-side—do not exhibit one-to-one correspondence with value chain stages, as each instrument type can operate across all stages, collectively influencing industrial innovation and value addition. This approach enables analysis of policy instrument requirements throughout industry development. The integration of Institutional Collective Action (ICA) theory with policy instrument theory within this framework addresses critical gaps in intergovernmental cooperation mechanisms. ICA theory explains how institutional collective action dilemmas — particularly those arising from fragmented governance structures in the Western Greater Bay Area—shape the design and combination of policy instruments.

a. **Supply-side policy instruments** primarily function as driving forces for industrial development through government provisions of technology, talent, services, and infrastructure that foster innovation and growth. These instruments address basic industrial development needs and generate sustained effects despite their gradual impact manifestation.

b. **Environment-side policy instruments** receive particular emphasis due

to their pivotal role in mitigating these dilemmas through financial support, tax incentives, regulatory measures, and strategic initiatives that create favorable policy environments, optimize market conditions, and remove institutional barriers. While their effects manifest gradually, they produce enduring impacts by addressing fundamental coordination challenges in multi-jurisdictional governance.

c. **Demand-side policy instruments** act as pulling forces through government measures that create market demand and reduce uncertainty, often generating substantial short-term effects though typically with less endurance compared to other instrument types.

The innovation value chain encompasses the complete process from innovation sourcing to new product transformation and ultimate marketization. Since Porter's seminal value chain theory (1985), this research domain has gained significant scholarly attention. The process constitutes interconnected innovation entities forming a chain-like assembly where each link enhances technological development value (Huang et al. 2006). The value chain innovation dimension divides the innovation process into three stages-scientific research, industrialization, and commercialization-examining innovation activities from interactive, systematic, and continuous perspectives (Nelson 2008). This viewpoint comprehensively demonstrates the value enhancement process from innovation sources to product promotion, objectively reflecting innovation mechanisms while adhering to industrial development pattern. Emerging industry growth aligns structurally and substantively with innovation value chain realization, with scholars dividing technological formation to industrialization completion into three major steps: technological productization, product industrialization, and commodity commercialization (Liu 2009). Similar segmentation appears in innovation value chain scholarship, as Turkenburg (2002) categorizes it into research and development, demonstration, and diffusion stages.

This paper investigates how central government, Guangdong Province, and Western GBA regions develop the modern financial industry by analyzing value realization processes across innovation value chain stages. This conceptual integration serves dual purposes: first, it enables each value chain stage to function as distinct policy objectives, providing supplementary analytical perspectives; second, as the modern financial industry represents an emerging sector, innovation value chain segmentation aligns with industry growth stages (Yu and Liu 2014). This approach mediates policy-driven industry development exploration, facilitating detailed examination of phased growth. Based on industry characteristics and key events, the innovation value chain divides into three stages—scientific/technological R&D, industrialization, and marketization (Liu and Jian 2011)—permitting thorough investigation of policy instrument influences on the modern financial industry's innovation value chain.

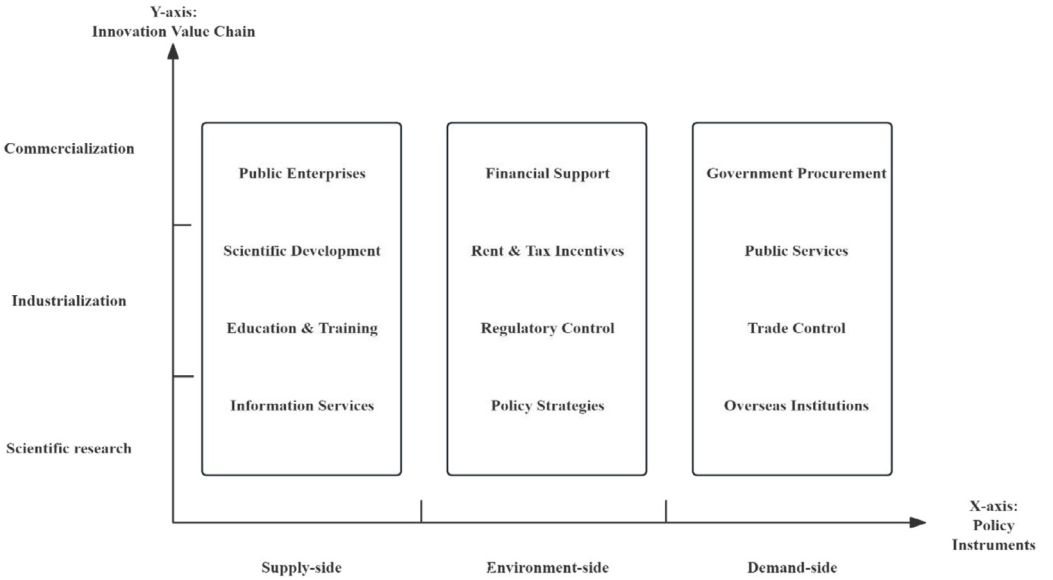

Figure 1. Two-Dimensional Analytical Framework for Policy Texts in the Modern Financial Industry

Data Sources and Methods

Policy Texts

Considering that local policies often originate from central policies and that this study involves the government policies of Guangdong Province, the Macao Special Administrative Region, the Hengqin Guangdong-Macao Deep Cooperation Zone, Zhuhai City, Zhongshan City, and Jiangmen City, the policy research samples for this study follow specific principles of openness, authority, and relevance. Policy texts were collected through government gazettes available on the official websites of the central government and various provincial and municipal governments. These gazettes provided access to publicly released legal regulations, notices, measures, ordinances, and announcements. Considering the differences in policy publication channels between the Macao government and mainland Chinese governments, the scope of collection channels was expanded to include the Macao government's official website. In particular, the "So Fai Yi" portal was used to gather laws, administrative regulations, administrative orders, and directives from the Chief Executive. Considering that the "four new industries" were first explicitly mentioned in the "Hengqin Plan" released on September 5, 2021, this section limits the collection period of modern financial industry policy documents to three years from the establishment of the Hengqin Guangdong-Macao Deep Cooperation Zone, i.e., from September 5, 2021, to August 31, 2023. During this period, a total of 44 policy documents related to the modern financial industry were collected.

Table 1: Example of Policy Text Coding

Policy Code	Policy Name	Policy Text Content	Policy instrument	Value Chain Link
HQ3-5-3	"Special Support Measures for Enterprise Listing in the Hengqin Guangdong-Macao Deep Cooperation Zone"	Article 5 Service for Pre-listing Enterprises (3) Investment and Financing Services: The Financial Development Bureau regularly organizes project roadshows for enterprises in the listing and pre-listing cultivation pools, assisting enterprises in connecting with banks and investment institutions to enhance their financing capabilities...improving core competitiveness and comprehensive listing capabilities.	Consulting Services	Technology R&D

To ensure the accuracy and credibility of the policy text data in this study, the coding process is primarily led by the author. Additionally, two master's degree students are invited to serve as coders, performing the coding and cross-checking each other's work. Any policy clauses with coding disagreements are recorded. The coders then discuss the disputed policy clauses with the author to reach a consensus. After receiving appropriate training on the coding rules, they independently coded the content of 44 policy texts (see Appendix A). The consistency of their evaluations of the same policy clauses was then tested through reliability analysis. In this study, when calculating the consistency evaluation, the Holsti's reliability formula was used to obtain the consistency coefficient K (0.879) for coding the policy texts related to the modern financial industry in the Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen regions. Here, M (430) represents the number of clauses with consistent coding by the two coders, and N1 (473) and N2 (505) are the number of codes by the two coders respectively, where n is the number of policy - tool coders. This coefficient indicates that the two coders achieved a high level of agreement in their coding of the policy texts. Additionally, the reliability R value of 93.6% suggests that the category reliability constructed by the two coders for the policy text content is at a high level. The higher the consistency degree of the categories determined by the two coders, the larger the R value, which means the coding is more reliable.

$$K = \frac{2M}{N_1 + N_2} \qquad R = \frac{nK}{1 + (n-1)K}$$

The Holsti's reliability formula

This study utilizes the content analysis method for policy instruments to conduct a quantitative analysis of the usage frequency of policy instruments in the central government, Guangdong Province, and the western GBA's modern financial industry policies. This analysis provides a basis for optimizing the policy path selection for the integration of the modern financial industry in the Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen regions.

Interviews

Based on the research needs, 29 experts were selected for interviews (see Table 2) with two core criteria: thematic relevance and regional coverage. They were recruited from the government, business, and academic sectors across Hengqin, Macao, Zhuhai, Zhongshan, and Jiangme—key regions of the western Guangdong-Hong Kong-Macao Greater Bay Area (GBA). Basic statistical analysis and opinion collation were conducted. By selecting and inviting government officials, corporate executives, and university experts engaged in the modern financial industry for in-depth interviews, this study aimed to verify the policy text analysis results. Additionally, the interviews sought to understand the issues with the collaborative development of industrial policies in the Hengqin-Macao-Zhuhai-Zhongshan-Jiangmen area, the actual impact of modern financial industry policies, and the future policy needs for the collaborative development of the western GBA's industries.Individual interviews were conducted, each lasting between 30 minutes to 1 hour.

Grounded theory (Glaser and Strauss 1967) is applied to deeply interpret the elite interview data and the quantitative analysis results of policy instruments (see Table 3). This helps to clarify the key influencing factors of policy instruments and their interactions with the policy process. Open Coding: Decompose and interpret the content provided by the interviewees, label and extract concepts, and condense consistent concepts into supportive categories. Axial Coding: Combine policy process theory and policy instrument theory to analyze the relationships between open codes and policy instruments, summarizing the related main categories. Selective Coding: Focus on the main issues of this study, extracting the core categories of industrial policy. During the analysis of experiential interview data, irrelevant information is excluded, and duplicate content is merged to improve the efficiency of data analysis.

Table 2: List of 29 experts

Sector	No.	Interviewee's Organization	Region
Government Departments (13 persons)	1	Hengqin Financial Affairs Bureau	Hengqin
	2	Zhongshan Development and Reform Bureau, Comprehensive Industrial Economic Development Division	Zhongshan
	3	Hengqin Legal Affairs Bureau, Comprehensive Affairs Division	Hengqin
	4	Hengqin Economic Development Bureau	Hengqin
	5	Macao Trade and Investment Promotion Institute	Macao
	6	Macao Trade and Investment Promotion Institute, Public Relations and External Cooperation Department	Macao
	7	Macao Productivity and Technology Transfer Center, External Cooperation and Expansion Department	Macao
	8	Macao Productivity and Technology Transfer Center	Macao
	9	Macao Central Securities Depository and Clearing Company	Macao
	10	Zhongshan Fusha Town Committee	Zhongshan
	11	Jiangmen Commerce Bureau	Jiangmen
	12	Jiangmen Development and Reform Bureau	Jiangmen
	13	Zhongshan Human Resources and Social Security Bureau, Gangkou Branch	Zhongshan
Higher Education Institutions (2 persons)	14	Zhuhai Party School	Zhuhai
	15	Faculty of Social Sciences, University of Macau	Macao
Enterprise Representatives (14 persons)	16	Hengqin Finance Association	Hengqin
	17	Macao Real Estate Development Chamber of Commerce; Macao New Century Investment Consulting Co., Ltd.	Macao
	18	Macao International Technology Industrial Development	Macao
	19	Macao Chinese General Chamber of Commerce, Guangdong Office	Hengqin
	20	Zhuhai Hengqin New District Hengxuda Commercial Factoring Co., Ltd.	Hengqin
	21	Hengqin-Guangdong-Macao Deep Cooperation Zone Investment Co., Ltd.	Hengqin
	22	Guangdong Yanghang Law Firm	Zhongshan
	23	China Galaxy Securities Co., Ltd., Guangzhou Business Department	Guangdong
	24	Ping An Bank Zhuhai Branch	Zhuhai
	25	China Merchants Bank Zhuhai Branch	Zhuhai
	26	Industrial and Commercial Bank of China, Hengqin-Guangdong-Macao Deep Cooperation Zone Branch	Hengqin
	27	Hengqin Rural Bank	Hengqin
	28	SPD Bank Zhuhai Branch	Zhuhai
	29	Bank of China Jiangmen Branch	Jiangmen

Table 3: Example of Interview Data Coding

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
Policy Formulation Process	Expert Interview No. 1 (Government): "There is a problem of regional competition in the coordinated development of Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen. Local governments should focus on integrated development and strive to avoid a situation where they each act independently."	d1.a problem of regional competition in the coordinated development d2.governments should focus on integrated development	D1. Promoting Regional Industrial Integration and Coordination (d1, d2, d3, d4, d5)	Industrial Policy Innovation Practice Platform

Findings

Content Analysis of Policy Texts

Based on the coding scheme for policy text quantitative analysis (see Appendix B for details), a total of 494 instances of policy instruments were used in the 44 collected policy documents. Below is the usage of supply-side, environment-side, and demand-side policy instruments in the policies related to the modern financial industry by the central government and various governments in the western GBA (see Table 4). Overall, in the modern financial industry policies, environment-side policy instruments are used the most, accounting for 91%. This overwhelming reliance suggests governments are prioritizing control and subsidy over innovation or demand creation, which may worsen coordination dilemmas. Supply-side policy instruments rank next at 6%, and their relatively low usage suggests that less emphasis is placed on the direct provision of resources and support to the financial industry for stimulating innovation. Meanwhile, the minimal use of demand-side policy instruments, at only 3%, indicates that measures to boost market demand in the financial sector are severely lacking.

Table 4: Content Analysis Results of Modern Financial Industry Policy instruments

Category	Policy instruments	Central Government	Guangdong	Macao	Hengqin	Zhuhai	Zhongshan	Jiangmen	Sub total	Total / Percentage
Supply-Side Policies	Public Enterprises	0	5	0	0	0	8	1	14	
	Scientific Development	0	3	0	0	1	0	1	5	29/
	Education & Training	0	1	0	0	1	1	1	4	5.9%
	Information Services	0	0	0	5	0	1	0	6	
	Financial Support	0	1	12	57	39	33	23	165	
Environment-Side Policies	Rent & Tax Incentives	0	0	0	3	1	0	0	4	450/
	Regulatory Control	0	7	176	3	3	43	2	234	91.1%
	Policy Strategies	0	8	1	3	9	18	8	47	
	Government Procurement	0	0	0	0	0	0	0	0	
Demand-Side Policies	Public Services	0	2	0	0	4	0	0	6	15/
	Trade Control	0	7	0	0	0	0	1	8	3.0%
	Overseas Institutions	0	0	0	0	1	0	0	1	
Subtotal		0	34	189	71	59	104	37	494 / 100%	
Percentage (%)		0.0	6.9	38.3	14.4	11.9	21.1	7.5	100.0	/

Among the supply-side policy instruments, public enterprises, consulting services, scientific development, and education and training account for 48%, 21%, 17%, and 14% respectively. This indicates that various levels of government promote stable and sustainable industry growth by providing infrastructure, service platforms, or direct financial services. At the same time, the importance of consulting services highlights the government's reliance on enhancing financial data processing capabilities and information technology in the context of the digital age to support the efficiency and transparency of financial markets.

Among the environment-side policy instruments, regulatory control, financial affairs, and policy strategies account for 52%, 37%, and 10% respectively, while tax incentives account for only 1%. This indicates that various levels of government emphasize regulating and promoting the healthy development of modern industries through regulatory control and financial support. However, the application of tax incentive measures is extremely limited, suggesting that tax policies have not yet fully played their role in incentivizing and guiding the development of the modern financial industry. There is a need to further strengthen tax re-

ductions and incentives to promote investment and innovation within the industry, thereby enhancing its internal development momentum.

In the application of demand-side policy instruments, the government significantly prefers using trade control and public services to manage the market and provide support, accounting for 53% and 40% respectively. This indicates that the government's main goal is to protect the domestic market and maintain financial stability through strict trade controls and to regulate financial transactions. At the same time, the substantial investment in public services suggests that the government is committed to establishing a robust financial service infrastructure, including consumer protection, market regulation, and risk management, to enhance the inclusiveness and resilience of the financial system. The use of policy instruments for overseas institutions is only 7%, reflecting the government's cautious attitude towards international financial cooperation and market openness. The use of government procurement in financial service policy instruments is zero, which may indicate that the government aims to avoid direct market intervention, maintain market autonomy and competitive order, and avoid becoming the dominant force in market competition. Through this policy mix, the government seeks a balance between intervention and laissez-faire to promote a healthy, orderly, and efficient financial market environment.

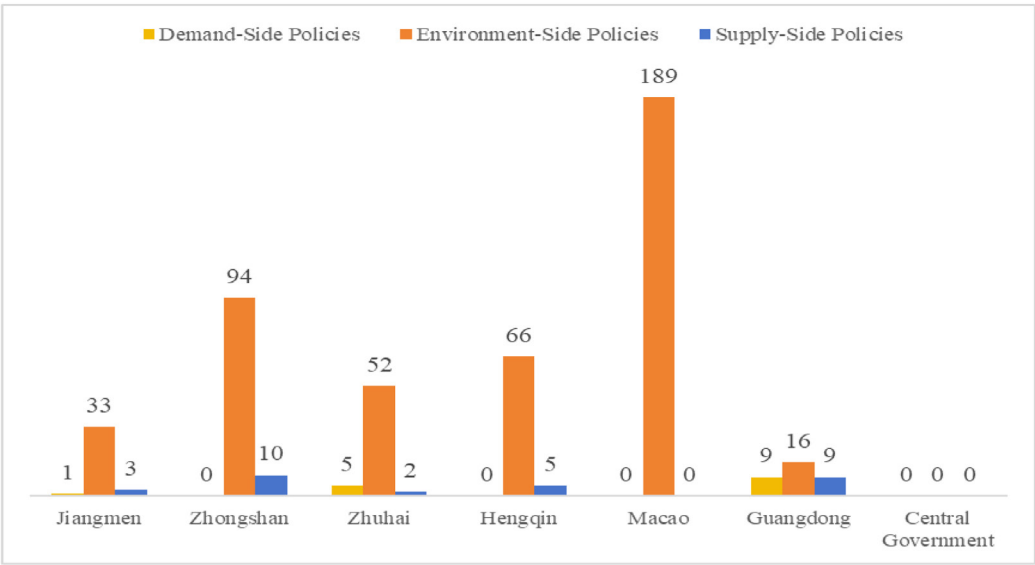

Figure 2: Statistics on Policy instruments for the Modern Financial Industry by Different Levels of Government

The central and various levels of government in the western GBA have shown differences and similarities in the overall usage of the three types of policy instruments for the modern financial industry (see Figure 2).

In terms of the number of provisions used, there are significant differences in the attention paid by different governments to the modern financial industry. The top three governments with the highest frequency of policy instrument usage are "Macao" (189 times), "Zhongshan" (104 times), and "Hengqin" (71 times). The central government did not collect policies strongly related to the modern financial industry in the designated collection channels. The reason for this is that the central government has not published policies related to the modern financial industry in its official gazette. The People's Bank of China's "Opinions on Financial Support for the Construction of the Hengqin Guangdong-Macao Deep Cooperation Zone and the Qianhai Shenzhen-Hong Kong Modern Service Industry Cooperation Zone" was jointly issued with the Guangdong Provincial Government and appeared in the Guangdong Provincial Government Gazette, but it was not mentioned in the central government's gazette. At all levels of government, environment-side policy instruments are predominantly used in modern financial industry policies, followed by supply-side policies, with demand-side policies being the least used. This reflects that in the process of formulating policies for the modern financial industry, policymakers prioritize building a solid and sustainable financial ecosystem. This involves comprehensively strengthening the legal system to ensure that financial activities take place in a clear and fair legal environment, thereby protecting investors' rights and maintaining market fairness. At the same time, enhancing the regulatory framework to monitor and manage potential systemic risks ensures that the behavior of financial institutions aligns with industry norms, thereby improving the overall stability of the financial market.

1. Supply-Side Policy instruments

Supply-side policies are the direct driving force behind the development of the modern financial industry. The usage of supply-side policy instruments is illustrated in Figure 3.

Public enterprise policies are unevenly distributed across regions, with only Guangdong, Zhongshan, and Jiangmen utilizing these instruments. This lack of investment in public financial enterprises elsewhere leads to resource over-concentration, hindering a comprehensive and diverse development environment, and is detrimental to coordinated regional growth in the financial industry.

The data reveals disparities in the implementation of scientific development and educational training policies. Guangdong province shows proactive efforts, whereas Zhuhai and Jiangmen lag behind, and other regions lack such policies altogether. This highlights a significant deficiency in collaboration among Macao, Hengqin, and the Zhuhai-Zhongshan-Jiangmen area. Scien-

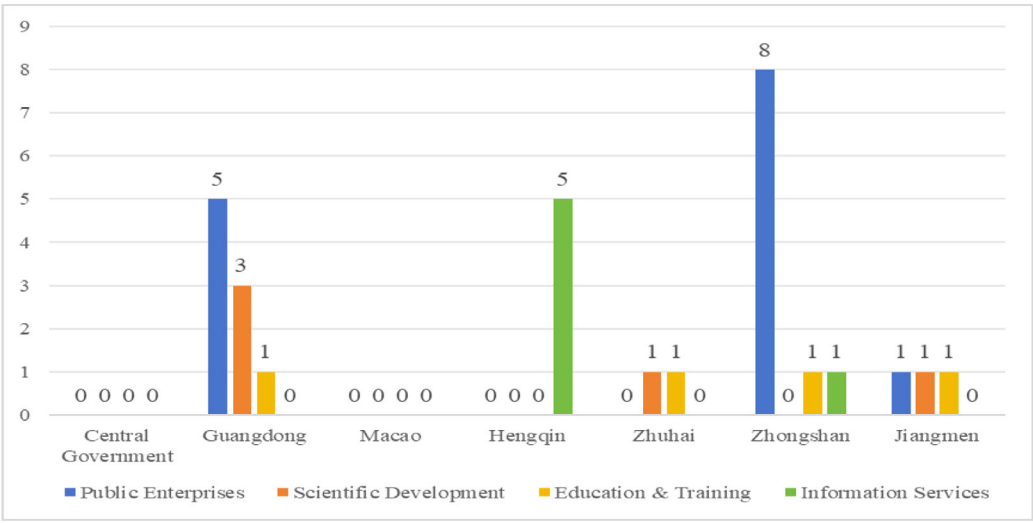

Figure 3: The usage of supply-side policy instruments

tific development is crucial for industrial innovation and advancing financial products, while educational training ensures continuous financial technology development. Regions lacking these policies, especially Macao and Hengqin, face challenges like product homogenization, insufficient innovation, and a lack of financial talent, impacting local market competitiveness and sustainable economic development. Effective policies require cross-regional and inter-departmental collaboration. The lack of coordination leads to fragmented policies and scattered resources. Local governments should establish communication and resource-sharing channels to promote policy consistency and coherence.

Information service policies are underutilized, with significant emphasis only in Hengqin and minimal application in Zhongshan. Other regions neglect the importance of information services, which are critical for enhancing market efficiency, enterprise competitiveness, industry modernization, and internationalization. Neglecting these services limits regional development and influence in the modern financial industry.

Governments should increase policy support for building information service platforms and promote government-enterprise collaboration. This will elevate the informatization level of the financial industry and foster a collaborative development environment. Effective communication and collaboration between governments are crucial for comprehensive implementation and maximizing the benefits of information service policies. Cross-regional information service alliances and sharing mechanisms can better integrate resources, promote information sharing, and accelerate financial innovation. This will drive the financial market's overall upgrade in the western Pearl River Delta region and enhance its international competitiveness.

2. Environment-Side Policy instruments

The purpose of formulating environment-side policies is to create a favorable development atmosphere for the industry. The usage of environment-side policy instruments is illustrated in Figure 4.

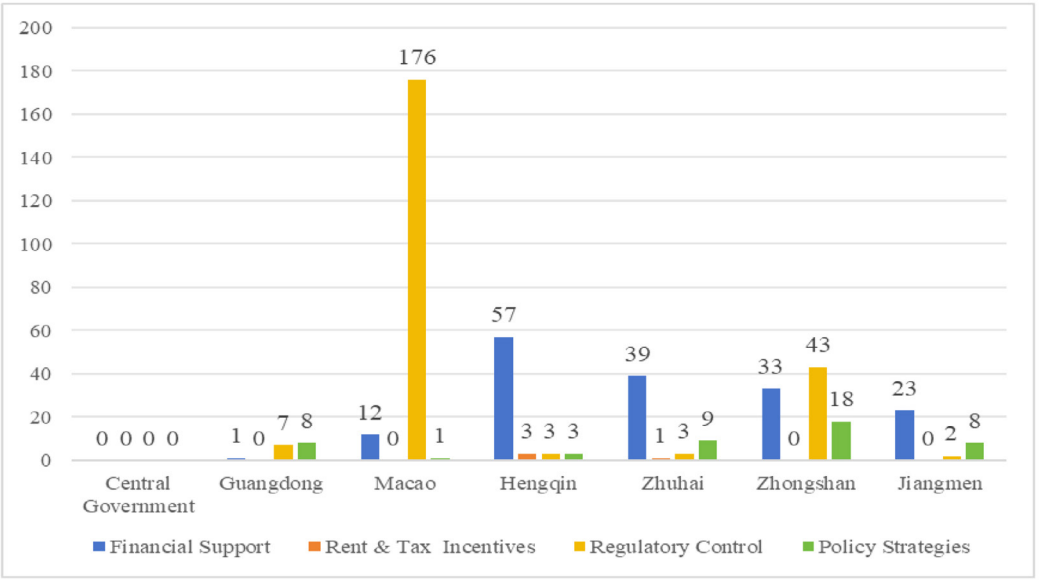

Figure 4: The usage of environment-side policy instruments

There is significant variation in the use of financial policy instruments across regions. Hengqin (57 times), Zhuhai (39 times), Zhongshan (33 times), and Jiangmen (23 times) surpass other areas in frequency. In the modern financial sector, "Regulations and Control" and "Financial" policy instruments dominate, making up over 80% of total usage. This indicates a narrow approach by governments in selecting policy instruments for financial industry development. Regional governments frequently use "financial" tools, such as subsidies or public listings, to attract financial enterprises. However, this reliance may signal a lack of long-term strategies or weaknesses in fostering industrial innovation and enhancing financial services. It also suggests that financial institutions prioritize economic incentives, leading to unhealthy competition rather than genuine market demand and innovation. The similarity in financial development strategies in the "14th Five-Year Plans" of Zhuhai, Zhongshan, and Jiangmen highlights policy homogenization.

Tax incentive policies are underutilized: Hengqin (3 times), Zhuhai (1 time), and none in other regions. This reflects a failure to effectively use tax policies to guide financial development. Central and local governments in Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen should create more at-

tractive tax incentives to boost regional financial market vitality and promote innovation. Additionally, existing tax incentives should be evaluated to ensure they meet policy objectives and enhance the regional financial industry's competitiveness. Policymakers should promote cross-regional collaboration to establish a favorable tax environment, fostering coordinated economic growth and stable financial market development.

Macao's usage of regulatory policy instruments is significantly higher than other regions (176 times), with Zhongshan also notable (43 times). In contrast, Guangdong used these tools 7 times, Hengqin and Zhuhai each 3 times, and Jiangmen only 2 times, while the central government has no recorded usage. These differences in regulatory strategies may stem from distinct economic structures, financial market development stages, and attitudes towards financial security. This disparity indicates a lack of a unified financial risk management system and complementary regulations. Increased coordination and harmonization of financial regulatory policies are needed. Establishing a unified framework for financial risk management and regulatory standards can reduce discrepancies and foster a more integrated and resilient financial environment. Enhanced collaboration between Macao, Guangdong, and other regions can align regulatory policies, promoting stability and growth in regional financial markets.

The use of policy strategy tools is similar in Guangdong Province, Zhuhai, Zhongshan, and Jiangmen, while Macao and Hengqin have fewer such strategies. This disparity highlights a lack of collaboration in modern financial industry planning between Guangdong and Macao. To address this, they should establish a closer coordination mechanism for consistent and complementary financial planning. Through regular strategic dialogues and consultations, the regions can identify key collaboration areas and coordinate the financial industry chain's development. Additionally, they can explore cross-border financial projects for resource sharing, promoting coordinated development and competitiveness in the regional financial market.

3. Demand-Side Policy instruments

Demand-side policies refer to measures through which the government creates and stimulates market demand by means of government procurement, trade controls, public services, and overseas institutions, thereby driving the development of the modern financial industry. The usage of demand-side policy instruments is illustrated in Figure 5.

The central government, Macao, Hengqin, and Zhongshan have not utilized demand-side policy instruments in the modern financial industry. This lack of engagement suggests insufficient support for creating and expanding market demand, leaving financial institutions reliant on existing market conditions for growth. The absence of incentives, such as government procurement

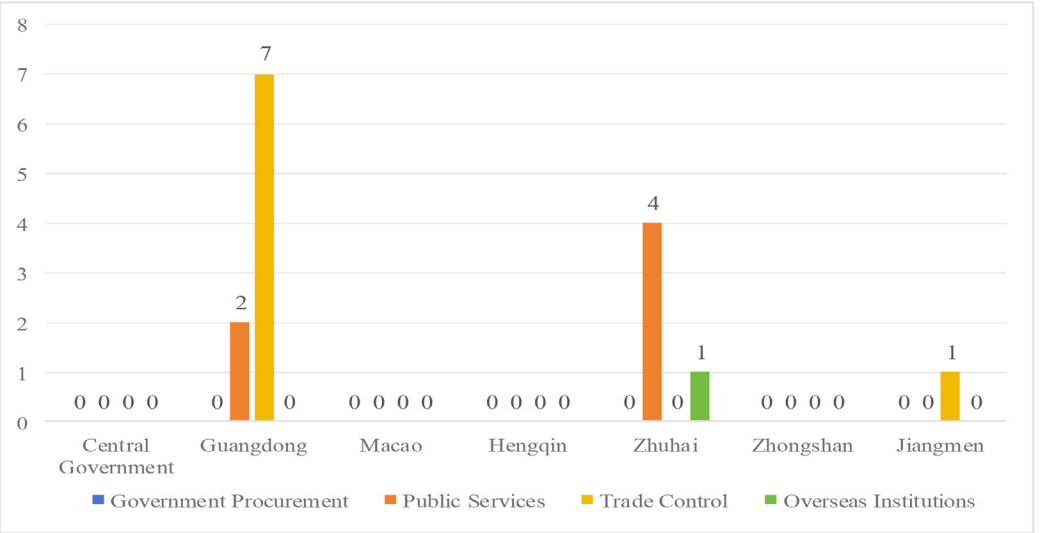

Figure 5: The usage of demand-side policy instruments

of financial products, cross-border financing support, and investment in financial infrastructure, hinders financial service innovation and diversification, limiting global market influence. Local governments should implement demand-side policies to enhance market demand, stimulate financial innovation, and boost the industry's global competitiveness.

Zhuhai has proactively used public service and overseas institution policy instruments, unlike other regions. This highlights differences in resource allocation and policy priorities across the western GBA, impacting regional competitiveness in the financial industry. Such disparities can affect the flow of talent and capital, exacerbating development imbalances. Regional governments should coordinate efforts and adopt uniform policies to promote balanced growth. Ensuring equitable resource distribution and aligning policy initiatives can foster an integrated and competitive financial industry, reducing development gaps and encouraging broader economic synergy in the GBA.

Guangdong Province has employed more trade control policy instruments in the modern financial industry, but subordinate governments in Hengqin, Zhuhai, Zhongshan, and Jiangmen have not followed suit. This disconnect in policy transmission and execution can weaken the overall impact, insufficiently supporting the financial industry's development. Guangdong Province needs to enhance communication, supervision, and evaluation mechanisms with these local governments. Ensuring smooth implementation of upper-level policies across all government levels is crucial for achieving policy goals. This coordinated effort will foster a more supportive environment for the financial industry's growth and development.

Two-Dimensional Framework Distribution Statistics

Among the 494 policy clauses related to the modern financial industry, policy instruments for R&D, industrialization, and marketization account for 15.7%, 41%, and 43.3%, respectively. The highest frequency of policy instrument usage is in the mid and late stages of the innovation value chain, indicating that the modern financial industry in the studied region is in the early stages of marketization. This phase focuses on building the financial industry chain and marketizing financial products.

The distribution of policy instruments shows the government's commitment to improving the regulatory framework and stimulating the regional financial industry chain through financial means. However, this policy structure, which emphasizes market and industrial operations, may neglect foundational research and innovation in financial products and core competitiveness. This trend is evident from the gradual decrease in supply-side policies across the stages of technological R&D, industrialization, and marketization.

In the mid and late stages of the innovation value chain—industrialization and marketization—the proportion of supply-side and demand-side policy instruments is extremely low. This suggests an over-reliance on market forces and a neglect of policy guidance and demand creation. The government should enhance supply-side and demand-side policies, such as promoting innovative financial products through public procurement and expanding the external market for financial services via international cooperation.

Based on the above analysis, future development strategies for the modern financial industry must focus on balancing all stages of the innovation value chain. This includes increasing investment in foundational research and innovation incentives to ensure the development of core competitiveness and sustainable growth of the industry (see Table 5).

a) Technological Research and Development Stage

At the front end of the innovation value chain in the modern financial industry, namely the R&D stage, policies in the western Greater Bay Area focus primarily on environment-side policy instruments. Regulatory control has the highest proportion, followed by financial and public utility policies on the supply side. This indicates that Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen are working to build and improve the legal and regulatory framework, creating a stable financial environment, ensuring market operation, and preventing risks. Financial policies also aim to attract domestic and foreign financial enterprises to the western GBA, promoting the modern financial industry's development.

b) Industrialization Stage

At the mid-stage of the innovation value chain, namely the product industrialization stage, Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen primarily

Table 5: Distribution of the Innovation Value Chain in the Modern Financial Industry

Modern Financial Industry	Innovation Value Chain	Technological R&D Stage	Industrialization Stage	Marketization Stage	Subtotal
Supply-Side Policy instruments	Public Enterprises	9	3	2	29
	Scientific Development	4	1	0	
	Education & Training	2	2	0	
	Information Services	4	2	0	
Environment-Side Policy instruments	Financial Support	12	111	42	450
	Rent & Tax Incentives	0	4	0	
	Regulatory Control	32	57	145	
	Policy Strategies	7	15	25	
Demand-Side Policy instruments	Government Procurement	0	0	0	15
	Public Services	0	6	0	
	Trade Control	7	0	1	
	Overseas Institutions	0	1	0	
Total		77	202	215	494

rely on financial policies from the environment-side tools category. The use of other policy instruments is limited, focusing mainly on financial, regulatory control, and policy strategy aspects. This indicates that the region's policies during industrialization are based on development planning and layout, attracting enterprise investment and development through various financial policies, and gradually improving modern industry laws and regulations.

However, there is a noticeable shortage of supply-side and demand-side policy instruments directly supporting the industrialization of the modern financial industry. While this strategy lays a foundation for early industrial clustering and growth, it neglects direct support for the innovation capabilities of financial enterprises and the market adaptability of financial products. This oversight could challenge maintaining innovation vitality and market competitiveness during critical industrialization stages.

c) Marketization Stage

At the marketization stage, modern financial industry policies in Hengqin,

Macao, Zhuhai, Zhongshan, and Jiangmen primarily rely on environment-side policy instruments, focusing heavily on regulatory control. Among the 12 types of policy instruments, regulatory control, financial, and policy strategy tools account for 98.6% (212 out of 215) of usage, with virtually no use of other policy instruments.

This indicates that the modern financial industry's development at the marketization stage is relatively homogeneous, with unbalanced policy support. This could limit market diversification and depth, due to insufficient policy incentives for financial enterprise innovation and service quality improvement. Consequently, the potential for competitiveness and sustainability in the modern financial industry may not be fully realized, affecting the long-term competitiveness of the entire regional financial sector.

The research on the coordinated development of the modern financial industry in Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen concludes with an analysis and synthesis to clarify the specific roles of policy instruments in the development of the modern financial industry. By utilizing the three-level coding of grounded theory (see Appendix C for full transcripts), a model for optimizing modern financial industry policies is constructed (see Figure 6). This model aims to visually demonstrate the dynamic interactions between policy instruments and the processes of policy formulation, implementation, and evaluation. It analyzes the effectiveness of policy instruments at different stages of the policy process, providing policy decision-makers with reference points for optimizing policy combinations and adjusting policy strategies.

In policy-making, creating an innovative practice platform for industry policies is key. Establishing a differentiated and competitive modern financial system in the western GBA, with targeted policies on talent and infrastructure, helps optimize financial infrastructure and professional talent supply. This addresses weak regional financial foundations and talent shortages, expanding development space and driving innovation. The demands from differentiated development promote resource integration and coordination, enhancing regional financial linkage. Additionally, it encourages regional governments to seek relaxed financial policy-making authority from higher levels, diffusing Hengqin's policy advantages, enhancing industrial policies, and increasing replication potential.

As stated by Expert Interview No. 12 (Government), "For the coordinated development of Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen, it is essential to leverage Hengqin's policy advantages." Developing advantageous industrial policies and replicating them in the Zhuhai, Zhongshan, and Jiangmen regions is crucial for coordinated industrial development. This perspective aligns with the proposed strategy of optimizing financial infrastructure and professional talent supply, addressing regional weaknesses, and driving innovation.

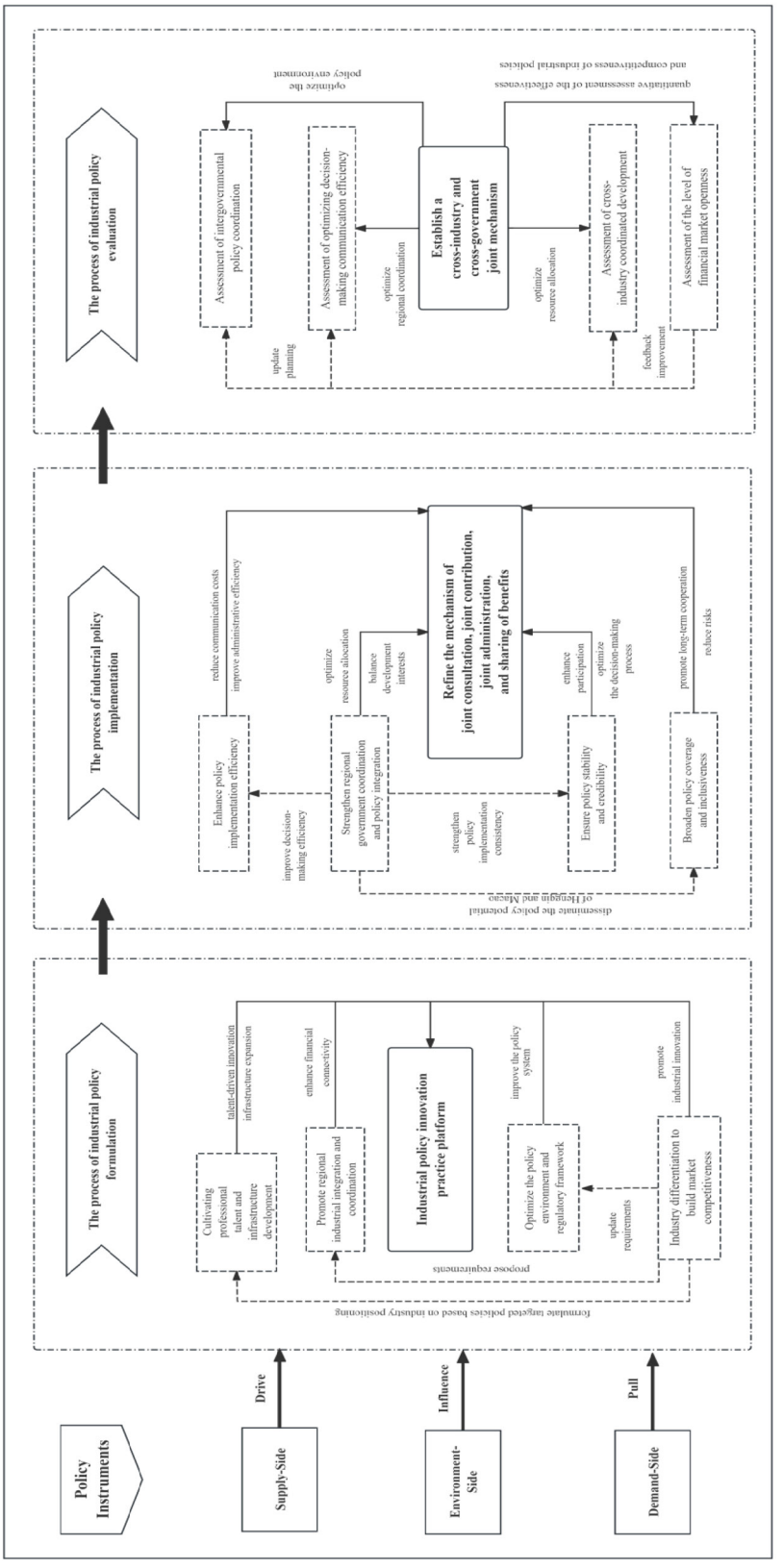

Figure 6: Modern Financial Industry Policy Optimization Model

A new mechanism for coordinated cross-border financial development optimizes the policy environment, achieves breakthroughs in supervision, improves the policy system, and supports modern financial industry development. Expert Interview No. 20 (Business) highlights, "The lack of cross-border financial policies is currently a shortcoming in the development of Hengqin's financial industry... It is hoped that the Hengqin government can actively communicate with Macao, Guangdong Province, and relevant national departments regarding cross-border financial policies and introduce more financial policies as soon as possible." This supports the argument for enhancing regional financial linkage and seeking relaxed financial policy-making authority.

In policy implementation, the core task is refining the "joint consultation, joint contribution, joint administration, and sharing of benefits" mechanism. Balancing regional interests and optimizing resource allocation strengthens government coordination and policy integration in the western GBA. This improves decision-making and execution efficiency, reducing communication costs, and enhances policy consistency through optimized fault tolerance mechanisms. Expert Interview No. 2 (Government) elaborates on this mechanism: "The 'consultation, co-management, co-construction, and sharing mechanism' of the Hengqin Guangdong-Macao In-depth Cooperation Zone is an excellent policy that can enhance coordination at the government level. It provides an important framework and guidance for collaborative cooperation at the governmental level." Expert Interview No. 8 (Academia) further supports this by stating, "Improving the efficiency of decision-making and execution through enhanced coordination mechanisms will significantly benefit the policy implementation process and reduce friction between different administrative bodies."

This mechanism ensures policy stability, narrows regional execution differences, reduces risk-avoidance and protectionism, increases government credibility, and promotes long-term government-enterprise cooperation, lowering investment risks. Additionally, lowering financial policy thresholds and expanding coverage maximizes Hengqin and Macao's policy potential. Merging policy applications and increasing regional government participation further optimize decision-making and address cross-border policy alignment issues. These measures improve the policy environment, open the financial market, and promote regional industrial development. Expert Interview No. 14 (Business) also emphasizes, "By integrating policy applications and enhancing government participation, we can better align cross-border initiatives and foster a more cohesive regional development strategy."

In policy evaluation, the core objective is to establish a joint inter-industry and inter-governmental institution. Firstly, this institution would evaluate inter-governmental policy coordination, clarifying collaborative relationships and policy consistency

among departments in financial industry development. It would formulate unified strategic plans to ensure policy complementarity, reduce conflicts, and improve implementation effectiveness. Expert Interview No. 7 (Government) notes, "A unified strategic plan is essential for ensuring that different departments work together harmoniously and avoid policy conflicts." Secondly, by optimizing decision-making communication efficiency, it would identify and resolve bottlenecks in inter-governmental proposals, reducing communication costs between Guangdong and Macao and enhancing regional coordination. Additionally, by assessing inter-industry collaborative development, the institution would analyze constraints, address cooperation barriers, and seek policy incentives to optimize regional resource allocation. Expert Interview No. 9 (Government) underscores the importance of coordination: "The willingness for coordinated development between Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen, and the ability to integrate and coordinate resources for concentrated industrial development, are key to regional coordinated industrial development."

Lastly, by evaluating financial market openness, it would quantify industrial policy effectiveness and explore leveraging Hengqin and Macao's advantages to build core competitiveness and access international markets. Systematic policy evaluation would enhance inter-governmental coordination, stimulate growth through inter-industry collaboration, reduce enterprise operational costs, and support financial market internationalization, thereby enhancing the financial industry's competitiveness. Expert Interview No. 15 (Academia) adds, "Evaluating financial market openness will provide critical insights into the effectiveness of our policies and help us leverage regional advantages to compete on an international scale."

To summarize, the development of the financial industry requires multifaceted efforts in policy-making, implementation, and evaluation. By creating an innovative practice platform for industry policies, optimizing financial infrastructure and the supply of professional talent, and promoting a coordinated cross-border financial development mechanism, regional financial linkages can be effectively strengthened and regional competitiveness enhanced. In policy implementation, refining the "consultation, co-management, co-construction, and sharing" mechanism, optimizing resource allocation, and improving decision-making and execution efficiency can significantly enhance policy consistency and effectiveness. Finally, by establishing a joint inter-industry and inter-governmental institution for systematic policy evaluation, we can ensure the effectiveness of policies, and provide a solid foundation for the long-term development of the regional financial industry.

Development Strategies and Recommendations for Coordinated Development in the Western GBA

The Outline Development Plan for the Guangdong–Hong Kong–Macao Greater Bay Area (Central Committee of the Communist Party of China & State Council, 2019) sets an ambitious vision of building an innovation-driven economy by 2035, characterized by deep market interconnectivity, enhanced regional coordination, and world-class competitiveness. For the western GBA, realizing this vision requires more than incremental improvements; it calls for a fundamental deepening of cooperation, the fostering of industrial synergy, and the removal of persistent coordination bottlenecks. Within the framework of "One Country, Two Systems," the region must capitalize on Macao's unique role as "One Center, One Platform, One Base" while also drawing on the opportunities offered by the jointly managed Hengqin Cooperation Zone. High-quality development will depend on institutional innovation, regulatory alignment, and the creation of mechanisms capable of bridging the divides that continue to fragment policy and practice.

The first priority is to strengthen strategic guidance from the central and Special Administrative Region (SAR) governments. Policy coordination in the western GBA is confronted with institutional and cultural differences that span law, governance, and economic practice, and which complicate the free movement of talent, capital, information, and technology. Stronger leadership from the central government is necessary to resolve structural barriers to integration, while local governments must shift from a model that leans heavily on market forces toward one that embraces government-led planning, coordination, and supervision. Establishing a joint conference mechanism that brings together the relevant actors in the western GBA would help ensure that development strategies are both coherent and effectively implemented. For Zhuhai, Zhongshan, and Jiangmen in particular, a more proactive stance is needed. Rather than relying primarily on central transfers or directives, these cities should reassess their positioning, develop stronger organizational capacities, and participate more actively in shaping the region's strategic direction. Meanwhile, the Guangdong provincial government has an equally important role to play as an overarching coordinator, ensuring that resources are allocated fairly, policies are aligned, and competition among cities does not undermine regional integration. Within this structure, Macao and Zhuhai should be encouraged to lead the "One Core, One Belt, One Zone" model, working closely with Zhongshan and Jiangmen to cultivate new growth poles that can anchor the western subregion's economic rise.

A second imperative is to build a diversified and multi-level coordination mechanism that integrates vertical and horizontal dimensions of governance. At the vertical level, coordination between the central government and local authorities is vital for advancing financial innovation. Here, the estab-

lishment of a Modern Financial Industry Development Coordination Office under the GBA Development Leading Group would provide the institutional focus needed to drive integration in the financial sector. At the same time, the Guangdong and Macao governments could enhance the Guangdong–Macao Joint Conference Mechanism by creating a Joint Committee for Financial Industry Development, responsible for translating the principle of "co-consultation, co-construction, co-management, and co-sharing" into concrete outcomes. Horizontally, coordination must extend across departments, sectors, and industries. A cross-departmental financial coordination system among western GBA cities would help align financial infrastructure development, cross-border services, and fintech innovation. Complementing this, the formation of sectoral associations in banking, securities, and insurance could provide standardized practices, facilitate resource pooling, and foster cooperation among non-governmental financial institutions. Taken together, these vertical and horizontal arrangements would provide a robust governance framework capable of sustaining coordinated financial development.

Finally, achieving balanced growth in the western GBA requires an open cooperation mechanism that promotes industrial integration across cities with varied economic foundations. Industrial complementarity, rather than duplication, should guide this process. Macao can leverage its role as a gateway for cultural and economic exchange, while Hengqin addresses the challenges of Macao's limited space and industrial hollowing. By integrating the financial industries of Macao and Hengqin with those of Zhuhai, Zhongshan, and Jiangmen, the subregion can begin to construct a more interconnected industrial chain. This process should be supported by a resource-sharing cooperation mechanism, including an Industrial Innovation Development Cooperation Fund that finances cross-city projects and an integrated communication platform for policy alignment on industry, talent, and project collaboration. Improving the environment for innovation talent is particularly critical: policies that facilitate mobility, create professional opportunities, and provide high-quality services will be essential for retaining and attracting skilled individuals. In addition, building distinctive industrial platforms can further enhance regional competitiveness. Hengqin, as a major cooperation hub, should lead in constructing platforms for emerging industries, while other cities participate in developing cross-regional initiatives such as intellectual property exchanges, e-commerce zones, and technology–finance industrial parks. Extending these platforms to link with cities beyond the western GBA would further broaden the development space and market reach of the subregion

Taken together, these strategies underscore the importance of leadership, institutional design, and openness in shaping the western GBA's future. Strengthened guidance from central and provincial authorities, the creation of multi-level coordination mecha-

nisms, and the promotion of open industrial cooperation can provide the institutional scaffolding necessary for the subregion to overcome fragmentation and accelerate integration. In so doing, the western GBA will not only narrow its developmental gap with the central and eastern zones but also contribute to the Greater Bay Area's broader ambition of becoming a globally competitive, innovation-driven economic powerhouse.

Conclusion and Future Directions

This study has examined the policy framework shaping the modern financial industry in the western Guangdong–Hong Kong–Macao Greater Bay Area (GBA), drawing on theories of institutional collective action and policy instruments, and employing a mixed-methods approach that combined quantitative text analysis with elite interviews. The findings reveal a fragmented policy landscape: while Macao has developed a relatively mature financial system, neighboring mainland cities remain oriented toward supporting small and medium enterprises and the real economy, resulting in uneven development and weak synergies. The overwhelming reliance on environment-side instruments—particularly regulatory measures and financial support—demonstrates a preference for legal frameworks and subsidies over more dynamic supply- and demand-side tools. This imbalance, together with the lack of clear industrial positioning across cities, has limited the region's ability to build a coherent and competitive financial ecosystem.

Yet these challenges also point to important opportunities. The western GBA has the potential to become a testing ground for innovative institutional arrangements under "One Country, Two Systems," and to pioneer models of regional coordination that can inform broader national strategies. Unlocking this potential requires more systematic integration of government, industry, academia, and society, as well as deeper cross-border collaboration to align regulatory frameworks, clarify divisions of labor, and optimize resource allocation. A more balanced and flexible mix of policy instruments, tailored to different stages of the innovation value chain, will be critical in fostering long-term competitiveness.

Moreover, the governance challenges observed in the western GBA are not unique; they echo experiences from other major cross-jurisdictional regions, such as the Yangtze River Delta in China and several EU cross-border regions (e.g., the Greater Region in Europe). These cases similarly grapple with fragmentation in policy instruments, misaligned regulatory frameworks, and uneven economic development. However, the western GBA is distinctive in its operation under the "One Country, Two Systems" principle, which introduces both constraints and opportunities for institutional innovation does not present in other contexts. Comparative insights suggest that successful regional governance often hinges on the establishment of supralocal

coordination bodies, the integration of policy tools across the supply-demand-environment spectrum, and the capacity to adapt generic models to local political-economic conditions. In this light, the western GBA represents a critical case for understanding how subnational coordination unfolds in hybrid institutional settings.

At the same time, this study has its limitations. The scope of policy texts, the analytical framework, and the available data constrain the breadth of our conclusions. Future research should expand beyond the financial sector to incorporate other emerging industries, and should broaden the sources of policy data—drawing, for example, on industry regulators or large-scale policy databases—to enable richer cross-industry and longitudinal comparisons. Methodologically, new analytical frameworks such as a "policy instruments–industry life cycle" model or adaptive process tools like the PDCA cycle could provide fresh insights into the dynamics of policy coordination. Theoretical development is equally necessary: collective action theory, while useful, requires further refinement to account for China's distinctive political and institutional context, and to more precisely capture the mechanisms that drive intergovernmental cooperation.

Looking forward, the western GBA stands at a pivotal juncture. Whether it becomes a peripheral subregion or a driver of the Greater Bay Area's global competitiveness depends largely on the ability of governments to experiment with new forms of coordination and of scholars to provide rigorous, context-sensitive analyses of these efforts. In this sense, the western GBA is not only a site of regional policy innovation but also a living laboratory for advancing theories of collective action, policy integration, and industrial governance. By addressing current fragmentation while boldly experimenting with new models, the region has the chance to transform policy coordination from a persistent bottleneck into a catalyst for high-quality, innovation-led development.

Appendix A

List of policies related to the modern financial industry issued by governments at various levels (central government, Guangdong Province, Macao, Hengqin Guangdong-Macao In-Depth Cooperation Zone, Zhuhai, Zhongshan, and Jiangmen) from September 5, 2021, to August 31, 2023.

Serial No.	Policy Name	Issuing Region	Issuing Date	Web links
M13	授予經濟財政司司長一切所需權力，以便代表澳門特別行政區政府與中國太平保險集團有限責任公司簽署合作框架協議。	Macao SAR	21-Feb-22	https://bo.io.gov.mo/bo/i/2022/08/ordem09_cn.asp
M14	許可“中國人民保險（香港）有限公司”在澳門特別行政區開設分公司經營一般保險業務。	Macao SAR	7-Mar-22	https://bo.io.gov.mo/bo/i/2022/10/ordem12_cn.asp
M15	許可住所設於澳門特別行政區的“安達保險澳門股份有限公司”藉發行股票增加其公司資本。	Macao SAR	7-Mar-22	https://bo.io.gov.mo/bo/i/2022/10/ordem13_cn.asp
M16	許可在澳門特別行政區設立一名為“南粵金融租賃（澳門）股份有限公司”的融資租賃公司。	Macao SAR	25-Apr-22	https://bo.io.gov.mo/bo/i/2022/17/ordem16_cn.asp
M17	將經第32/2021號行政命令許可設立的“中國銀行（澳門）股份有限公司”的開業期間延長。	Macao SAR	30-May-22	https://bo.io.gov.mo/bo/i/2022/22/ordem20_cn.asp
M18	許可“中國光大銀行股份有限公司”在澳門特別行政區設立一分行從事銀行業務。	Macao SAR	18-Jul-22	https://bo.io.gov.mo/bo/i/2022/29/ordem29_cn.asp
M21	許可在澳門特別行政區設立一名為“中澳融資租賃股份有限公司”的融資租賃公司。	Macao SAR	26-Sep-22	https://bo.io.gov.mo/bo/i/2022/39/ordem39_cn.asp
M23	第15/2022號法律，信託法	Macao SAR	14-Nov-22	https://bo.io.gov.mo/bo/i/2022/46/lei15_cn.asp
M24	許可住所設於澳門特別行政區的“安達保險澳門股份有限公司”藉發行股票增加其公司資本。	Macao SAR	16-Jan-23	https://bo.io.gov.mo/bo/i/2023/03/ordem01_cn.asp
M25	許可“保誠保險有限公司”在澳門特別行政區開設分公司經營人壽保險業務。	Macao SAR	26-Jan-23	https://bo.io.gov.mo/bo/i/2023/04/ordem03_cn.asp

Serial No.	Policy Name	Issuing Region	Issuing Date	Web links
M27	許可在澳門特別行政區設立一名為“國泰君安證券（澳門）一人有限公司”的金融機構，其所營事業為提供證券交易、財富管理及因投資金融工具產生的融資服務。	Macao SAR	6-Mar-23	https://bo.io.gov.mo/bo/i/2023/10/ordem10_cn.asp
M35	許可住所設於澳門特別行政區的“中國太平人壽保險（澳門）股份有限公司”藉發行股票增加其公司資本。	Macao SAR	10-Jul-23	https://bo.io.gov.mo/bo/i/2023/28/ordem58_cn.asp
M36	第13/2023號法律，金融體系法律制度	Macao SAR	14-Aug-23	https://bo.io.gov.mo/bo/i/2023/33/lei13_cn.asp
M38	許可住所設於澳門特別行政區的“工銀（澳門）退休基金管理股份有限公司”藉發行股票增加其公司資本。	Macao SAR	10-Jan-22	https://bo.io.gov.mo/bo/i/2022/02/ordem04_cn.asp
M39	許可住所設於澳門特別行政區的“忠誠澳門保險股份有限公司”藉發行股票增加其公司資本。	Macao SAR	5-Jun-23	https://bo.io.gov.mo/bo/i/2023/23/ordem21_cn.asp
HQ2	橫琴粵澳深度合作區外商投資股權投資類企業試點辦法（暫行）	Hengqin	16-Jun-22	http://www.hengqin.gov.cn/macao_zh_hans/zwgk/zcfg/hqzc/jrzc/content/post_3528981.html
HQ3	橫琴粵澳深度合作區支持企業赴澳門發行公司債券專項扶持辦法（暫行）	Hengqin	16-Jun-22	http://www.hengqin.gov.cn/attachment/0/312/312130/3417901.pdf
HQ7	橫琴粵澳深度合作區企業上市掛牌專項扶持辦法	Hengqin	15-Sep-22	http://www.hengqin.gov.cn/macao_zh_hans/zwgk/zcfg/hqzc/jrzc/content/post_3428879.html
HQ8	橫琴粵澳深度合作區促進金融產業發展扶持辦法	Hengqin	25-Oct-22	http://www.hengqin.gov.cn/macao_zh_hans/zwgk/zcfg/hqzc/jrzc/content/post_3441318.html
HQ14	橫琴粵澳深度合作區企業赴澳門發行債券專項扶持辦法	Hengqin	8-Jun-23	http://www.hengqin.gov.cn/macao_zh_hans/zwgk/zcfg/hqzc/jrzc/content/post_3538010.html

Serial No.	Policy Name	Issuing Region	Issuing Date	Web links
ZH2	珠海市促進實體經濟高質量發展專項資金（小升規企業獎勵）管理實施細則	Zhuhai	21-Oct-21	https://www.zhuhai.gov.cn/zw/fggw/ztfl/gyjt/content/post_3012177.html
ZH3	落實<關於促進民營經濟高質量發展的若干政策措施>做好緩解企業融資難融資貴相關工作的實施方案	Zhuhai	25-Oct-21	https://www.zhuhai.gov.cn/zw/fggw/ztfl/gyjt/content/post_3015306.html
ZH8	珠海市金融改革發展“十四五”規劃	Zhuhai	5-Jan-22	https://www.zhuhai.gov.cn/zw/fggw/ztfl/czjrsj/content/post_3050619.html
ZH15	珠海市內外經貿發展專項資金（促進對外投資及區域經貿合作事項）實施細則	Zhuhai	5-May-22	https://www.zhuhai.gov.cn/zw/fggw/ztfl/smkaly/content/post_3144169.html
ZH17	珠海市助力企業紓困支持供應鏈票據融資實施細則	Zhuhai	24-Jun-22	https://www.zhuhai.gov.cn/zw/fggw/ztfl/czjrsj/content/post_3308189.html
ZH26	珠海市加強普惠金融服務促進實體經濟高質量發展專項資金（四位一體融資平臺信貸風險補償及貸款貼息用途）管理實施細則	Zhuhai	24-Nov-22	https://www.zhuhai.gov.cn/zw/fggw/ztfl/gyjt/content/post_3456716.html
ZH29	珠海市省級先進製造業發展專項資金（普惠性製造業投資獎勵）管理實施細則	Zhuhai	16-Jan-23	https://www.zhuhai.gov.cn/zw/fggw/ztfl/gyjt/content/post_3479351.html
ZH34	珠海市2023年促進外貿穩定增長若干措施“支持中小微企業防範匯率風險”事項實施細則	Zhuhai	11-Jul-23	https://www.zhuhai.gov.cn/zw/fggw/zfgb/2023n/202307/bmgfxwj/content/post_3568612.html
ZS2	中山市外商投資股權投資企業試點工作暫行辦法	Zhongshan	20-Dec-21	http://www.zs.gov.cn/zwgk/zfgb/zfgb202120/gfxwj/content/post_2067807.html
ZS4	中山市科技信貸風險準備金管理辦法	Zhongshan	17-Jan-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202202/gfxwj/content/post_2079744.html

Serial No.	Policy Name	Issuing Region	Issuing Date	Web links
ZS7	中山市金融業發展“十四五”規劃	Zhongshan	15-Feb-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202203/zcjd/content/post_2083696.html
ZS12	中山市商務發展專項資金（促進利用外資項目）實施細則	Zhongshan	13-May-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202207/bmgfwj/content/post_2113374.html
ZS14	中山市村鎮低效工業園改造升級融資貸款風險補償金實施細則	Zhongshan	5-Jul-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202211/bmgfxwj/content/post_2152764.html
ZS15	中山市高質量發展母基金管理辦法	Zhongshan	20-Jul-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202212/sfbwj/content/post_2153018.html
ZS20	中山市支持企業融資專項扶持資金管理暫行辦法	Zhongshan	30-Dec-22	http://www.zs.gov.cn/zwgk/zfgb/zfgb202301/bmgfxwj/content/post_2227585.html
JM12	江門市金融支持跨境融資專項資金管理辦法	Jiangmen	24-Jan-22	http://www.jiangmen.gov.cn/newzwgk/zfgb/zfgb2022nd1q/bmgfxwjxd/content/post_2599620.html
JM21	江門市金融發展改革“十四五”規劃	Jiangmen	20-Jun-22	http://www.jiangmen.gov.cn/newzwgk/zfgb/zfgb2022nd6q/szfwjxd/content/post_2660679.html
JM42	江門市中小企業“政銀保”融資項目實施方案（2023年修訂）	Jiangmen	25-May-23	http://www.jiangmen.gov.cn/newzwgk/zfgb/zfgb2023nd6q/bmgfxwjxd/content/post_2906732.html

Serial No.	Policy Name	Issuing Region	Issuing Date	Web links
GD3	廣東省開展合格境內有限合夥人境外投資試點工作暫行辦法	Guangdong Province	29-Oct-21	http://www.gd.gov.cn/zwgk/gongbao/2022/21/content/post_3988868.html
GD11	廣東省境外投資管理辦法實施細則	Guangdong Province	25-Dec-21	http://www.gd.gov.cn/zwgk/gongbao/2022/1/content/post_3765421.html
GD13	關於推進廣東自貿試驗區貿易投資便利化改革創新的若干措施	Guangdong Province	29-Jan-22	http://www.gd.gov.cn/zwgk/gongbao/2022/5/content/post_3829279.html
GD20	廣東省發展綠色金融支持碳達峰行動的實施方案	Guangdong Province	24-Jun-22	http://www.gd.gov.cn/zwgk/gongbao/2022/20/content/post_3980279.html
GD24	金融支持橫琴粵澳深度合作區和前海深港現代服務業合作區建設意見	Guangdong Province	23-Feb-23	http://www.hengqin.gov.cn/macao_zh_hans/zwgk/zcfg/hqzc/jrzc/content/post_3529279.html
GD25	2023年廣東金融支持經濟高質量發展行動方案	Guangdong Province	28-Feb-23	http://www.gd.gov.cn/zwgk/gongbao/2023/6/content/post_4116774.html

Appendix B

Classification and Explanation of Policy instruments

Category	Policy instruments	Definitions	Examples
Supply-Side Policies	Public Enterprises	Measures related to the establishment and management of public enterprises, such as innovation in state-owned enterprises, development of emerging industries, and public enterprises spearheading new technologies.	To implement the spirit of the "Overall Plan for the Construction of the Hengqin Guangdong-Macao Deep Cooperation Zone" issued by the Central Committee of the Communist Party of China and the State Council, support the development of the Macao bond market, encourage enterprises in the Hengqin Guangdong-Macao Deep Cooperation Zone (hereinafter referred to as the Cooperation Zone) to effectively utilize the Macao bond market for direct financing, reduce their costs of issuing corporate bonds in Macao, and formulate this method based on the actual situation of the Cooperation Zone. (HQ2-1-1)
	Scientific Development	Government actions to directly or indirectly encourage various scientific and technological developments, such as building research laboratories, supporting research societies, professional associations, and auxiliary research.	Actively promote the comprehensive application of new-generation information technologies such as cloud computing, big data, blockchain, and artificial intelligence in the financial field, support financial institutions in using technological means to drive iterative updates of financial products, service methods, business processes, and business models, improve financial service efficiency, and achieve a transformation towards proactive, personalized, and intelligent financial services. (ZH3-3-4)
	Education and Training	Policies related to the education system and training systems, such as discipline construction, internship programs, vocational education, and training.	Deepen industry-education collaboration, encourage universities in Zhuhai to offer financial courses, study the establishment of undergraduate and graduate programs in finance, and cultivate foundational talents for the financial industry. (ZH3-3-2)

Category	Policy instruments	Definitions	Examples
Environment-Side Policies	Information Services	Encouraging the flow of technical and market information, such as building libraries, providing advisory and consulting services, databases, information networks, and liaison services.	Hire experts and scholars with professional expertise, high academic attainments, and strong decision-making consulting capabilities to provide intellectual support and decision-making consultation for the financial reform and development of Zhongshan, and encourage experts and scholars to participate in research and consultation activities related to the financial field in the city, guiding more financial resources to gather in Zhongshan. (ZS3-5-5-2)
	Financial Support	Various forms of financial support given directly or indirectly to enterprises, such as loans, subsidies, franchises, loan guarantees, and export credit loans.	Newly registered or relocated licensed financial institutions, other licensed financial institutions, local financial organizations, and private equity fund managers in the Cooperation Zone, after the establishment of the Cooperation Zone, can apply for one-time settlement support according to the following regulations. (HQ4-5-1)
	Rent & Tax Incentives	Various tax reductions and exemptions given to enterprises, such as tax deductions and exemptions from indirect taxes.	Support financial institutions to set up branches and service outlets in industrial parks, and encourage the provision of office space support, tax and fee reductions, and other preferential policies. (ZH3-4-4)
	Regulatory Control	Measures to regulate market order, such as patent rights, production access, and intellectual property rights.	Financial institutions must comply with general laws when providing information and advertising to the public and must not engage in advertisements or promotional activities containing untrue, false, or misleading financial information or data, nor engage in activities that may affect the normal competitive relationship between financial institutions. (M13-1-2-16-2)

Category	Policy instruments	Definitions	Examples
	Policy Strategies	Various strategic measures formulated to assist industry development, such as planning, innovation incentives, encouraging mergers or alliances, public information, and guidance.	Support various eligible banks to develop businesses in Zhongshan by establishing new legal entities, branches, and specialized institutions, and support Hong Kong and Macao banking institutions to set up branches in Zhongshan. Encourage eligible Hong Kong and Macao insurance institutions to establish operating institutions in Zhongshan to further enhance the level of opening up the insurance industry. (ZS3-5-1-2)
Demand-Side Policies	Government Procurement	Various procurement regulations of central and local governments, such as government procurement, procurement by public enterprises, and contract research.	No corresponding policy text found.
	Public Services	Measures to address social issues, such as the construction of public infrastructure.	To support the construction of the Western Pearl River Delta Science and Technology Innovation Center, a specialized sci-tech financial service platform is being developed. This platform aims to guide and promote financial institutions, local financial organizations, and venture capital institutions in providing financing support and financial services to technology enterprises. (ZH3-4-3)

Category	Policy instruments	Definitions	Examples
	Trade Control	Import and export control measures, such as trade agreements, tariffs, and currency adjustments.	The controlling shareholders, actual controllers, or managing partners of foreign investment pilot fund management companies should be the following entities: those approved by the regulatory authorities of their home country or region to engage in investment management business, possessing licenses issued by the regulatory authorities of their home country or region, having a good investment performance, and managing a fund scale of no less than RMB 1 billion or equivalent foreign currency in the previous fiscal year before the application. (GD1-2-10-4)
	Overseas Institutions	The government directly establishes or indirectly assists enterprises in setting up various overseas branches, such as establishing overseas trade organizations.	Support enterprises in using RMB for direct overseas investment and financing. Promote the establishment of RMB overseas investment and loan funds, raising RMB funds from mainland China, Hong Kong, and Macao to provide investment and financing services for enterprises aiming to expand internationally. (ZH3-3-3-3)

Source: Based on the definitions of policy instruments in the study by Xie Qing and Tian Zhilong, "How Innovation Policies Promote the Development of China's New Energy Vehicle Industry—A Policy Text Analysis Based on Policy instruments and the Innovation Value Chain," combined with the content of this paper.

Appendix C

Coding of the Modern Financial Industry

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
Policy Formulation Process	Expert Interview No. 1 (Government): "There is a problem of regional competition in the coordinated development of Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen. Local governments should focus on integrated development and strive to avoid a situation where they each act independently." Expert Interview No. 9 (Government): "The willingness for coordinated development between Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen, and the ability to integrate and coordinate resources for concentrated industrial development, are key to regional coordinated industrial development. Cross-regional coordinated development requires specific guiding policy documents and should be based on the existing local foundations to formulate industrial coordination and division of labor." Expert Interview No. 12 (Government): "For the coordinated development of Hengqin, Macao, Zhuhai, Zhongshan, and Jiangmen, it is essential to leverage Hengqin's policy advantages. Developing advantageous industrial policies (rules, standards, planning) and replicating and promoting them in the Zhuhai, Zhongshan, and Jiangmen regions is the core mechanism for coordinated industrial development." Expert Interview No. 15 (Academia): "Macao faces two major challenges in its development: First, there is	d1.a problem of regional competition in the coordinated development d2.governments should focus on integrated development d3.The willingness for coordinated development d4.the ability to integrate and coordinate resources for concentrated industrial development d5.formulate industrial coordination and division of labor d6.it is essential to leverage Hengqin's policy advantages d7.Developing advantageous industrial policies d8.replicating and promoting advantageous industrial policies in the Zhuhai, Zhongshan, and Jiangmen regions d9. a significant shortage of existing financial talent, d10.find its unique market positioning	D1. Promoting Regional Industrial Integration and Coordination （d1、d2、d3、d4、d5 D2. Optimizing Policy Environment and Regulatory Framework （d6、 d7、 d8、d11、d12、d13,、d17、d18） D3. Cultivating Professional Talent and Infrastructure Development （d9、d15、d16） D4. Differentiated Industry Positioning and Building Market Competitiveness （d10、d14、d19）	Industrial Policy Innovation Practice Platform

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	a significant shortage of existing financial talent, lacking the professionals needed to drive market development. Second, being adjacent to the world financial center of Hong Kong, Macao needs to find its unique market positioning to develop its modern financial industry. Currently, Macao is primarily focused on issuing RMB government bonds, and its bond market is still in the early stages."			
	Expert Interview No. 20 (Business): "The lack of cross-border financial policies is currently a shortcoming in Hengqin's development of the financial industry and other industries. The Hengqin government does not have the authority to formulate cross-border financial policies and can only report suggestions up the hierarchy. It is hoped that the Hengqin government can actively communicate with Macao, Guangdong Province, and relevant national departments regarding cross-border financial policies and introduce more financial policies as soon as possible."	d11. The lack of cross-border financial policies d12. The Hengqin government does not have the authority to formulate cross-border financial policies d13.Hengqin government can actively communicate with Macao, Guangdong Province, and relevant national departments regarding cross-border financial policies		
	Expert Interview No. 23 (Business): "In terms of developing the modern financial industry, it is believed that the government should increase supply-side policies. The development of the modern financial industry requires not only environment-side policies but also supply-side policies to support industrial development. For example, the hardware	d14.The development of the modern financial industry requires not only environment-side policies but also supply-side policies to support industrial development d15.the hardware infrastructure needed for modern finance		

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	infrastructure needed for modern finance, such as trading system equipment and high-speed internet, requires substantial government investment. Additionally, there is a need for the cultivation and supply of financial talent. Currently, Macao and Hengqin still face deficiencies in both the quantity and quality of financial professionals."	d16.the cultivation and supply of financial talent		
	Expert Interview No. 29 (Business): "If Hengqin and Macao are to develop a modern financial industry, they must achieve substantial breakthroughs in financial regulation and establish forward-looking top-level design. If Hengqin and Macao cannot demonstrate stronger advantages in the modern financial industry compared to other mainland cities, it will be challenging to cultivate it as a competitive industry."	d17.achieve substantial breakthroughs in financial regulation d18.establish forward-looking top-level design d19.cultivate it as a competitive industry		
Policy Execution Process	Expert Interview No. 2 (Government): "The 'Co-consultation, Co-management, Co-construction, and Co-sharing Mechanism' of the Hengqin Guangdong-Macao In-depth Cooperation Zone is an excellent policy that can enhance coordination at the government level. It provides an important framework and guidance for collaborative cooperation at the governmental level. The core concept of this mechanism is to promote cooperation and mutual benefit among all parties through joint consultation, joint management, joint construction, and joint	d20.The 'Co-consultation, Co-management, Co-construction, and Co-sharing Mechanism' of the Hengqin Guangdong-Macao In-depth Cooperation Zone is an excellent policy d21.enhance coordination at the government level d22.promote cooperation and mutual benefit among all parties d23.close cooperation between the governments, enterprises, social	D5. Strengthening Regional Government Coordination and Policy Integration（d20、 d21、 d22、d23、 d36） D6. Enhancing Policy Implementation Efficiency and Execution（d24、 d25、 d28、d29、d35、 d37） D7. Ensuring Policy Stability and Credibility（d2、 d27、 d30、d31、 d32）	Detailing the "Co-consultation, Co-management, Co-construction, and Co-sharing" Execution Mechanism

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	sharing. It emphasizes close cooperation between the governments, enterprises, social organizations, and citizens of Hengqin and Macao to achieve common goals and shared benefits."	organizations, and citizens of Hengqin and Macao to achieve common goals and shared benefits	D8. Broadening Policy Coverage and Inclusiveness （d33、d34）	
	Expert Interview No. 3 (Governmentl): "The timeliness of policies is crucial for enterprises, as the ability to promptly benefit from these preferential policies directly impacts their development prospects. Some existing policies are being realized rather slowly, with instances where policies set in 2021 have still not been implemented by 2023. Such delays cause considerable distress for many enterprises, affecting their normal operations and eroding confidence in government policies. This negatively impacts the development of the modern financial industry."	d24.Slow Implementation of Policies d25.Erosion of Confidence in Government Policies		
	Expert Interview No. 9 (Government): "Currently, industrial policies lack room for error at the detailed execution level, leading to a 'less action, less error' situation and a tendency towards conservatism."	d26.industrial policies lack room for error at the detailed execution level, d27.a tendency towards conservatism		
	Expert Interview No. 14 (Academia): "Hengqin currently lacks sufficient popularity, and it is crucial to promptly implement the 'Double Fifteen' tax incentive policy to attract more enterprises and individuals to settle and develop in Hengqin. However, the current situation is that the tax policy has been proposed for a long time, but the thresholds and specific	d28.specific implementation details are lacking d29.the policy not being effectively executed		

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	implementation details are lacking, leading to the policy not being effectively executed." Expert Interview No. 15 (Academia): "From the perspective of general political science or political economy, the so-called policy's effectiveness or its true persuasiveness depends heavily on its stability. Of course, there is an even more important underlying issue, which is that the policy commitments made must be credible to others. The essence of any policy involves the question of whether these commitments are trustworthy. It is crucial to ensure that people believe these commitments are part of a feasible plan, meaning the policy must be both accurately executable and sustainable in the long term." Expert Interview No. 20 (Business): "Hengqin's financial policies have certain thresholds, making it difficult for private enterprises to benefit from these policies or requiring them to incur additional costs, putting them at a disadvantage compared to state-owned enterprises. Hengqin departments are very conservative in executing financial subsidy policies, limiting the modern financial industry to only those sectors explicitly mentioned in the policy text. Sectors that are not mentioned but are actually part of the modern financial industry, such as commercial factoring, are	d30. the so-called policy's effectiveness or its true persuasiveness depends heavily on its stability d31.The essence of any policy involves the question of whether these commitments are trustworthy d32.the policy must be both accurately executable and sustainable in the long term d33.financial policies have certain thresholds d34.very conservative in executing financial subsidy policies, limiting the modern financial industry to only those sectors explicitly mentioned in the policy text.		

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	unable to enjoy the subsidies."			
	Expert Interview No. 25 (Business): "Hengqin currently has many policies, but a significant portion of them lack specific implementation details, resulting in many enterprises and even government units being unsure of how to proceed."	d35.Hengqin currently has many policies, but a significant portion of them lack specific implementation details		
	Expert Interview No. 26 (Business): "Currently, there is a disconnect between the two governments in implementing policies in Hengqin. Mainland China's government tends to quickly implement directives issued by the central government, whereas the Macao government tends to lag behind. This leads to differences in the actual implementation of the same policies, which hinders the overall execution of these policies."	d36.there is a disconnect between the two governments in implementing policies d37.This leads to differences in the actual implementation of the same policies		
Policy Evaluation Process	Expert Interview No. 2 (Government): "It is recommended to strengthen coordination at the government level. Governments in different regions should establish a joint institution to jointly promote the coordinated development of Hengqin, Macao, and the Zhuhai-Zhongshan-Jiangmen (Zhongjiang) area. This joint institution could be responsible for formulating strategic plans and policy measures for coordinated development, fostering cooperation in economic, technological, cultural, and other areas. Such coordination and	d38.establish a joint institution to jointly promote the coordinated development d39.formulating strategic plans and policy measures for coordinated development	D9. Evaluation of Inter-Governmental Policy Coordination （d38, d39, d44） D10. Evaluation of Financial Market Openness （d40、d41） D11. Evaluation of Cross-Industry Coordinated Development （d42、d43） D12. Evaluation of Decision-Making	Establishment of a Cross-Government Joint Institution for Industry Development

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	collaboration would help enhance the overall competitiveness of Hengqin, Macao, and the Zhongjiang area, promoting the coordinated development of the regional economy and achieving a win-win situation."		Communication Efficiency Optimization（d45、d46、d48、d49）	
	Expert Interview No. 5 (Government): "Macao's existing relaxed financial environment and market serve as a good transit point for enterprises in the Zhuhai-Zhongshan-Jiangmen (Zhongjiang) area to expand into overseas markets, especially those of Portuguese-speaking countries."	d40.Macao's existing relaxed financial environment and market d41.serve as a good transit point for enterprises to expand into overseas markets, especially those of Portuguese-speaking countries.		
	Expert Interview No. 14 (Academia): "The Macao government lacks sufficient intrinsic motivation to develop the modern financial industry and does not have a strong awareness of actively collaborating with surrounding regions. They have not effectively utilized their special status with the central government to propose development needs, tending to favor the stability of existing industries."	d42.lacks sufficient intrinsic motivation to develop the modern financial industry d43.does not have a strong awareness of actively collaborating with surrounding regions d44. utilized their special status with the central government to propose development needs		
	Expert Interview No. 26 (Business): "Although Hengqin's 'case-by-case' system provides policy assistance to enterprises, its beneficiaries are primarily state-owned enterprises or private enterprises with access to higher-level managers. This results in small and medium-sized private enterprises being unaware of the possibility of applying for preferential policies through this 'case-by-case' system to settle in Hengqin	d45.Although Hengqin's 'case-by-case' system provides policy assistance to enterprises d46.small and medium-sized private enterprises being unaware of the possibility of applying for preferential policies through this 'case-by-case' system to settle in Hengqin		

Policy Process	Expert Opinions	Open Coding	Axial Coding	Selective Coding
	by-case' system to settle in Hengqin." Expert Interview No. 21 (Industry Expert): "There are some difficulties in policy formulation and communication coordination between the Guangdong and Macao governments in Hengqin. These difficulties mainly stem from differences in their philosophies and the potential efficiency issues of the joint consultation mechanism. Previously, the Hengqin Administrative Committee could make quick decisions and implement them immediately. However, the current Guangdong-Macao joint consultation requires multiple meetings and repeated discussions to reach a consensus. Sometimes, it takes seven or eight meetings to resolve an issue. This process incurs high communication costs. Additionally, differences in administrative practices due to varying systems, as well as differences in holiday schedules and leadership time arrangements, further increase the complexity of coordination."	d47.These difficulties mainly stem from differences in their philosophies and the potential efficiency issues of the joint consultation mechanism. d48.Sometimes, it takes seven or eight meetings to resolve an issue. d49.This process incurs high communication costs		

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Beyond Borders: Empowering Policy Scholarship in China and the Global South

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Abstract

Advancing policy scholarship in China and across the Global South requires a dynamic, collaborative research ecosystem that bridges national and disciplinary boundaries. The *Policy Studies Journal* (PSJ) has long advanced this goal by integrating diverse policy perspectives to address governance challenges. In his keynote at the

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International Conference on China Policy Studies (ICCPS), PSJ Editor-in-Chief Dr. Geoboo Song emphasized the need for adaptable policy process theories and cross-border collaboration. Building on his insights, this paper explores how transnational research collaboration can enrich theory and generate innovative responses to global challenges such as climate change, inequality, and public health. In recent years, Chinese policy scholars have made notable progress in both theoretical and applied policy research, contributing to this growing international dialogue, yet some barriers continue to limit their full participation in the global policy community. Forging enduring partnerships between the Global South and the West is both a strategic necessity and an intellectual imperative for addressing shared policy dilemmas.

Keywords: Research collaboration, comparative policy studies, policy theory development, China, Global South

Más allá de las fronteras: Impulsando la investigación política en China y el Sur Global

Resumen

El avance de la investigación política en China y en el Sur Global requiere un ecosistema de investigación dinámico y colaborativo que supere las fronteras nacionales y disciplinarias. La Revista de Estudios Políticos (PSJ) ha impulsado este objetivo desde hace tiempo integrando diversas perspectivas políticas para abordar los desafíos de gobernanza. En su discurso inaugural en la Conferencia Internacional sobre Estudios Políticos de China (ICCPS), el Dr. Geoboo Song, editor jefe de PSJ, enfatizó la necesidad de teorías adaptables sobre procesos políticos y la colaboración transfronteriza. Basándose en sus ideas, este artículo explora cómo la colaboración transnacional en la investigación puede enriquecer la teoría y generar respuestas innovadoras a desafíos globales como el cambio climático, la desigualdad y la salud pública. En los últimos años, los académicos chinos de política han logrado avances notables en la investigación política, tanto teórica como aplicada, contribuyendo a este creciente diálogo internacional. Sin embargo, algunas barreras continúan limitando su plena participación en la comunidad política global. Forjar alianzas duraderas entre el Sur Global y Occidente es tanto una necesidad estratégica como un imperativo intelectual para abordar dilemas políticos compartidos.

Palabras clave: Colaboración en investigación, estudios comparativos de políticas, desarrollo de teoría de políticas, China, Sur Global

超越国界：对中国及全球南方国家的政策研究进行赋能

摘要

推进中国乃至全球南方国家的政策研究，需要一个充满活力、协作互助的研究生态系统，打破国界和学科壁垒。长期以来，《政策研究杂志》(PSJ)致力于整合多元政策视角以应对治理挑战，从而推动这一目标的实现。在中国公共政策研究国际学术会议(ICCPS)的主题演讲中，PSJ主编Geoboo Song博士强调了构建适应性政策过程理论和开展跨边界协作的必要性。本文以Song博士的见解为基础，探究了跨国研究协作如何能丰富理论，并为应对气候变化、不平等和公共卫生等全球挑战提出创新性的解决方案。近年来，中国政策学者在理论和应用政策研究方面均取得了显著进展，为日益活跃的国际对话作贡献，然而，一些障碍仍然限制其充分参与全球政策讨论。建立全球南方国家与西方国家之间持久的伙伴关系，既是战略上的必然选择，也是用于应对共同政策困境的理论需求。

关键词：研究协作，比较政策研究，政策理论发展，中国，全球南方国家

Introduction

In recent years, there have been burgeoning discussions about "Global South issues" within the policy community, notably during the Conference on Policy Process Research (COPPR) meetings, which took place in Denver, Colorado, USA, in January 2023, and in Syracuse, New York, USA, in May 2024. These discussions highlighted the persistent challenges faced by policy scholars from the Global South and underscored the necessity for inclusive and diverse perspectives in policy research. The editors at the *Policy Studies Journal* (PSJ), a leading policy journal in the field, acknowledged these obstacles, prompting immediate and proactive action.

On June 14, 2024, Dr. Geoboo Song, the Editor-in-Chief of the *Policy Studies Journal* (PSJ), delivered a keynote address entitled "Bridging Policy Research Across Borders: Challenges and Opportunities for China" at the inaugural International Conference on China Policy Studies (ICCPS) in Bei-

jing, China. This event attracted a large audience of policy scholars, government officials, and academics eager to explore new venues in policy research in China. While Dr. Song's presentation was primarily aimed at policy researchers in China, it also held considerable significance for policy researchers across the Global South, emphasizing the importance of cross-border collaboration and knowledge exchange. Drawing on Dr. Song's keynote speech, we explore key ideas and concepts that could significantly enhance policy scholarship development in China and the Global South. The challenges and opportunities that arise when bridging policy research across international borders, especially on emerging trends, collaborative networks, and innovative methodologies that can enrich policy research in diverse contexts, are a focal point of discussion. Through these efforts, we attempt to foster a global dialogue that encourages mutual learning and understanding, ultimately contributing to more effective and impactful policy research worldwide.

As core members of the PSJ editorial team, we have had the privilege of working closely with scholars from around the world, witnessing firsthand the transformative power of collaborative policy research over the past five years since 2019. Through our interactions, we have witnessed the remarkable diversity of perspectives and innovative approaches that many policy scholars bring to the table. *Policy Studies Journal*, a premier publication outlet for theory-driven policy research, has been at the forefront of delivering cutting-edge research that addresses some of the most pressing global challenges. Our commitment to fostering a robust academic discourse ensures that the journal not only contributes to scholarly debates but also influences practical policymaking on a global scale.

While the journal has increasingly focused on the development of policy theory, theoretical contributions have largely been made through the testing of these theoretical foundations and arguments in diverse policy contexts and across different policy issue areas. Most prominent is the application of policy process theories for environmental and other "commons" problems, which span a wide range of policy topics, including climate change, energy, natural disasters, transportation, environmental regulation, water and land management, immigration, and social welfare (Fagan et al., 2024). Importantly, these focus areas largely reflect the issue attention of governing bodies (at least in the American context), which emphasizes the role of policy research in advising relevant and timely policy issues. This suggests that policy research is becoming more responsive to real-world trends, thereby aligning theory with practice in a way that makes addressing policy issues increasingly relevant for policy scholars.

In today's interconnected world, the challenges we face are increasingly complex, uncertain, and global in nature. Issues such as climate change, public health crises, and economic disparity do not recognize national boundaries. These problems demand a nuanced ap-

proach that takes into account a wide array of social, economic, and political contexts. As such, the need for robust, collaborative policy research has never been greater. Through a shared commitment to knowledge creation and dissemination, we can craft innovative solutions that benefit not just our own nations but the global community as a whole. To advance this goal, our paper examines the development of policy scholarship in China, emphasizing both the progress achieved and the barriers that continue to hinder more meaningful international engagement. While our analysis centers on the Chinese context, the lessons drawn carry broader implications for strengthening policy scholarship across the Global South and offer transformational solutions to global policy dilemmas.

Bridging Policy Research for Global Challenges

Tackling grand challenges, such as extreme weather events, disaster management, immigration crises, and water and food insecurity, requires collaborative and innovative efforts that transcend borders. To achieve this, it is essential to cultivate a conducive environment for collaboration among stakeholders throughout the policy process (Koebele and Crow, 2023; Shen, 2024). Enhancing collaboration can effectively mitigate conflicts centered on diverging policy beliefs, thereby promoting trust, encouraging mutual understanding, and reinforcing the importance of shared objectives that drive long-term cooperation and policy success. On the more practical applications of these ideas, Mewhirter et al. (2024) argue that the composition of these collaborative networks can constitute a critical element to the initiatives' successes by enhancing legitimacy and public trust via increased representation. Relatedly, Liu (2024) found that policy collaboration between different groups resulted in greater changes in policy adoption and greater favorability toward collaborative attributes.

Policy Studies Journal has been well known for its contributions to policy process theory research for over half a century. This area of research is pivotal, as the pressing global policy issues we face are often fraught with uncertainty, complexity, and the inherently "wicked" nature of such challenges. Wicked problems are those that are dynamic and complex, with no clear cause-and-effect relationship. Further, these problems lack a definitive formulation and solution(s), are connected to other larger problems, and are influenced by multiple divergent perspectives (Tiwale & Wagle, 2024; Churchman, 1967; Rittel & Webber, 1973). In these challenging and ambiguous policy contexts, questions around successful policy development must not only be focused on *what* decisions are made, but also on *how* these decisions are made. As such, the concepts of substantive rationality (which focuses on what decisions are made) and procedural rationality (which focuses on how decisions are made) are informative. *Substantive rationality* exists when a behavior or decision is appropriate for achieving goals in the context of a situation's constraints

and conditions (Simon, 1976), and is oriented around matching outcomes with values such that a decision is considered rational to the extent that it is aligned with the set of values of an individual or group. However, in addressing "wicked" problems in a society, the sets of values held by stakeholders are quite diverse and complicated. *Procedural rationality* thus becomes increasingly important as it (potentially) represents an avenue by which pursuits of substantive rationality can be constrained, allowing policy decisions to be made in ways that are broadly considered to be procedurally fair, leading to greater and broader acceptance of these decisions and, ultimately, greater efficacy in attaining the goals associated with these policy decisions. Indeed, it has been demonstrated that pursuing procedural rationality can debias decision-making (e.g., Pavićević & Keil, 2021), suggesting that this approach can create an environment wherein policy decisions aimed at addressing wicked problems are not only more likely to be made but are also more likely to achieve a relatively broader level of support.

As such, increasing procedural rationality, in practice, via developing and explicating policy process theories across contexts and governance systems, represents an avenue by which complex global challenges can be addressed in a more efficacious manner. More specifically, the increased understanding that policy process theories can enable the development of collaborative policymaking structures that are viewed fairly across a range of stakeholders with diverse sets of goals, thereby enhancing the likelihood that policy decisions aimed at addressing wicked problems are viewed as both procedurally and substantively rational, and, ultimately, successful.

Importantly, the challenges associated with reconciling diverse perspectives and developing fair processes are not confined to the policymaking process itself. Similar to successful collaboration in policy processes, effective research collaborations must navigate institutional, disciplinary, and epistemic divides. Just as governance networks seek to balance competing priorities and knowledge systems to address wicked problems and achieve shared policy outcomes, global research partnerships must reconcile differences in theoretical frameworks, methodological approaches, and institutional constraints. By sharing knowledge, resources, and expertise across borders, the quality and impact of policy research can be elevated. These collaborative efforts promote cultural exchange and mutual understanding, which are vital for addressing global challenges effectively.

Indeed, there are opportunities for the further development and application of policy process theories in China and the Global South. For example, Van den Dool and Li (2023) examine the utilization of Punctuated Equilibrium Theory (PET) in China and find increasing attention to this theory in the Chinese context. However, the authors note a disconnect between these studies and English-language PET research, indicating both a need and opportunity for developing collaborative research

across these contexts that is informed by scholars in both contexts. Similarly, Li and Weible (2021) examine applications of the Advocacy Coalition Framework (ACF) in China, finding both support for several of the ACF's hypotheses in the Chinese context as well as some distinctions between the Chinese context and ACF findings in Western contexts. These two cases demonstrate that theoretical frameworks such as the ACF and PET not only help explain collaboration among policymakers but also benefit from scholarly collaboration across contexts. While these studies demonstrate the transferability of policy process theories across contexts, they also highlight the need for, and benefits of, collaborations among scholars across cultural contexts to further develop theoretical understandings of the policymaking process and policy change, as well as develop practical solutions to complex global issues. Academics from different cultural and institutional environments utilizing and collaborating around a shared set of theoretical frameworks, such as the ACF or PET, allow for a deeper and more nuanced development of our understanding of the policy process and outcomes both within and across contexts. Thus, the interactions between policy practice and research collaboration become mutually reinforcing, with collaboration among policy actors shaping policy outcomes and scholarly collaborations leading to advances in theories that help explain and improve those outcomes.

Current State of Policy Research in China

China has made remarkable progress in policy research in recent years, from the *Normalization Phase* (2013–2022), when scholars advocated for a curriculum of greater academic rigor, scientifically aligned research paradigms, stronger empirical methods, and more credible publications, to the current *Transformation Stage* (2023–present), which elevated public policy as a subdiscipline and resulted in calls for deeper theoretical innovation and practical contributions (Cao, Xu, Yi, & Zhu, 2025). Throughout our tenure as core members of the PSJ editorial team, we have witnessed Chinese policy scholars, both domestically and internationally, contributing significantly to a broad spectrum of policy theories and substantive policy domains. Their work highlights innovative approaches and invaluable insights. For instance, the Advocacy Coalition Framework (ACF) was employed by Han, Swedlow, and Unger (2014) to analyze hydropower policy change, identifying two competing coalitions with distinct policy beliefs and resource mobilization strategies. Similarly, the Multiple Streams Framework (MSF) was adapted in the Chinese context in a study of homelessness policy, where legal scholars acting as policy entrepreneurs successfully advanced a proposal that was politically appealing to the central government (Cao, Xu, Yi, & Zhu, 2025). Meanwhile, a case study on elder-care policy reveals that policy diffusion in China is far from technocratic.

Instead, it is a political process in which local officials act as entrepreneurs who selectively adopt and scale experimental policies from other regions. These examples are but a few of many that demonstrate how Chinese scholars not only apply Western theories but also refine them to better fit unique political and institutional settings. Empirically, Chinese policy research has diversified significantly in recent years. Key research domains include comparative public policy, economic development, social policy, environmental governance, and innovation policy. These areas reflect both domestic priorities and China's increasing global footprint. Methodologically, the field has grown more rigorous and pluralistic. Quantitative approaches such as correlational analysis and causal inference are widely used, while case studies, interviews, and descriptive statistics remain foundational (Xiao and Yi, 2024).

This growing body of theoretically grounded empirical research has translated into a steady rise in scholarly output, both in domestic journals and (increasingly) in international publications (Xiao and Yi, 2024). In fact, policy scholars in China have published more articles in PSJ than in any other Asian country in recent years. An analysis of publication data from the Web of Science (www.webofscience.com) further illustrates this growing engagement. Between 2019 and 2024, a total of 15 PSJ articles were authored by policy scholars affiliated with Chinese institutions. The annual distribution shows some fluctuation, with two articles published in 2019, five in 2020, one in 2021, three in 2022, one in 2023, and three in 2024. Though there was a noticeable peak in 2020, the overall trend suggests a steady number of publications.

Despite this meaningful progress, Chinese policy scholars continue to face substantial challenges that hinder their full integration into the global academic community. These challenges manifest at two distinct but interconnected levels: individual constraints that shape scholars' capacity to conduct and disseminate research, and broader environmental barriers embedded in institutional structures and systemic academic practices (Song, 2022; Song, 2024). Understanding these obstacles is crucial for identifying pathways toward a more robust and internationally engaged policy research landscape.

At the individual level, one of the most pervasive difficulties is the ability to formulate research questions that push the boundaries of policy theory while maintaining strong empirical relevance (You et al., 2024). Many Chinese scholars excel in empirical analysis but often struggle with positioning their work within broader theoretical debates that resonate with international audiences. This struggle partly reflects differences in academic traditions. Chinese social science has historically emphasized policy relevance and problem-solving for domestic governance rather than theory-building or abstraction (You et al., 2024; Zang and Chan, 2020). In contrast, leading policy journals, including *Policy Studies Journal* (PSJ), tend to privilege studies that make explicit theoretical contributions—clarifying

causal mechanisms, extending existing frameworks, or testing them across diverse institutional settings (Weible & Cairney, 2018). The expectation of clear theoretical contributions in leading policy journals presents a steep learning curve, requiring scholars not only to engage with Western theoretical frameworks but also to refine their ability to articulate the significance of their findings within these frameworks. Bridging this gap requires Chinese scholars to engage more critically with comparative policy theories, such as the Advocacy Coalition Framework (ACF), Punctuated Equilibrium Theory (PET), and Multiple Streams Framework (MSF), and to explicitly articulate how their empirical cases refine or challenge those frameworks and theories (Li and Weible, 2021; Van den Dool and Li, 2023). Equally important is cultivating an awareness of the "audience expectations" of these journals—identifying what counts as a "theoretical contribution," how to situate findings within a global context, and how to frame research questions that appeal to readers from different cultural and political contexts (Van den Dool and Li, 2023).

Academic writing and publishing in English remain particularly formidable barriers. While an increasing number of Chinese scholars are proficient in English, the ability to craft a manuscript that satisfies the rhetorical and stylistic expectations of top-tier policy journals remains a persistent challenge (Zhang et al., 2025; Demeter et al., 2025). Writing for an international audience involves more than technical accuracy—it demands clarity, coherence, and a compelling argument that aligns with the conventions of global policy discourse. As a result, many otherwise high-quality studies struggle to gain visibility in the most influential policy journals, where editorial and peer review expectations can be unfamiliar and daunting. Studies of non-native English-speaking scholars show that many encounter difficulties in adopting the "authorial stance" expected in Anglophone academic writing, where argumentation is explicit and self-promotional (Flowerdew and Habibie, 2021). To overcome this, successful Chinese authors often seek collaboration with international co-authors, attend academic writing workshops, or engage professional editing and mentoring support; all strategies that have been shown to improve publication success (Hyland, 2023; Demeter et al., 2025). Expanding institutional support for academic writing in English through targeted funding, mentoring, and journal partnerships would significantly enhance Chinese scholars' capacity to contribute to and shape global policy discourse (Demeter et al., 2025).

Another pressing issue at the individual level is the difficulty in securing research funding, particularly for scholars outside elite institutions. While China has made substantial investments in research and development, funding distribution remains highly skewed, with major grants concentrated in a handful of top-tier universities (Wang et al., 2024). Scholars at less well-resourced institutions often lack the financial support necessary to conduct ambitious empirical studies, access internation-

al research networks, or participate in global conferences. This funding disparity reinforces existing hierarchies within the Chinese academic system, limiting opportunities for early-career researchers and scholars from non-elite backgrounds to establish themselves in the international policy research arena (Wang et al., 2025).

Beyond individual constraints, systemic environmental challenges further complicate the ability of Chinese scholars to engage meaningfully in global policy research (Song 2022, Song 2024). One of the most significant structural barriers is the demanding teaching and administrative workload that many faculty members face. Unlike research-intensive institutions in North America and Europe, where faculty members often receive substantial research time, many Chinese scholars must balance heavy teaching responsibilities with bureaucratic and institutional obligations. This leaves limited time for sustained research engagement, manuscript preparation, and the iterative revision process required for publication in top-tier policy journals.

Institutional incentives for international publication remain another significant challenge. While many Chinese universities have begun prioritizing high-impact journal publications as a measure of academic success, tenure and promotion systems still place substantial weight on domestic publications and government-sponsored research projects (Xu et al., 2021; Lu, 2022; Hyland, 2023). This emphasis discourages some scholars from pursuing international outlets, where review timelines can be lengthy and editorial standards unfamiliar. In some cases, scholars opt for domestic journals with faster turnaround times and more familiar expectations, even when their research has the potential to contribute meaningfully to global policy discussions.

Another key structural challenge is the relative isolation of Chinese scholars from global research networks. While scholars in North America and Europe benefit from well-established international collaborations that facilitate co-authored publications and cross-institutional mentorship, many Chinese researchers face systemic barriers to participating in these academic ecosystems (Demeter et al., 2025; Fang et al, 2022). Language constraints, institutional policies on international mobility, and funding limitations have all contributed to this gap. Without regular engagement in international policy conferences, collaborative research projects, and visiting scholar programs, Chinese scholars struggle to integrate their work into international scholarly debates, limiting both their professional visibility and the global impact of their research.

The structure of academic collaboration in China also presents unique constraints. Apart from many Western institutions, where research is often conducted in interdisciplinary teams and embedded within collaborative lab models, Chinese policy scholars frequently work in relatively isolated academic silos. The hierarchical na-

ture of Chinese academia, where senior faculty exert significant influence over research direction, can also pose serious challenges for early career scholars seeking to pursue innovative, cross-disciplinary, or unconventional research topics (Lu and Smith, 2022; Liu et al., 2024). This dynamic not only affects the diversity of policy research in China but also limits the ability of junior scholars to engage in international collaborative efforts that require flexibility and independent research leadership.

Finally, policy research in China operates within a broader socio-political context that shapes the contours of academic inquiry (Reny, 2016; Ollier-Malaterre et al., 2025; Harlan, 2019). Certain policy areas—particularly those related to governance, political reform, and contentious social issues—are subject to constraints that may limit scholars' ability to engage in open, comparative analyses. While Chinese scholars have made significant contributions in fields such as environmental policy, science and technology policy, public management, and economic development, research in politically sensitive areas may face institutional barriers that restrict data access, limit international collaboration, or discourage the pursuit of politically complex research questions. These constraints can make it difficult for scholars to engage fully in global policy discourse, where comparative political analysis and open empirical inquiry are often foundational to theoretical advancement.

The cumulative effect of these individual and structural challenges is a research landscape in which Chinese policy scholars, despite their increasing presence in the international arena, remain underrepresented in the most influential policy journals and global scholarly debates. Overcoming these barriers will require both structural reforms within Chinese institutions and greater efforts to facilitate cross-border academic integration. Recognizing and addressing these constraints is essential for ensuring that Chinese policy research can contribute sufficiently to the development of policy scholarship on a global scale.

Opportunities for Collaboration

Global collaboration in policy research has become increasingly crucial as scholars around the globe face common challenges that transcend national borders (Zsuzsanna et al., 2021). In particular, the role of Chinese policy scholars in shaping the international research landscape has been rising considerably during the 21st century, given China's rapid socio-economic transformation and growing influence in global affairs (Bersick & Jörn-Carsten, 2015; Duggan, 2022; Glaser & Saunders, 2002). Strengthening and increasing collaboration initiatives between Chinese and other non-Western policy researchers, and their Western international counterparts, can help better represent diverse perspectives, as well as collective influence in global policy research.

Despite these individual and structural challenges, there are encouraging signs of growing collaboration

between Chinese policy scholars and the international policy community. In recent years, several research networks initiated or co-led by Chinese scholars have started to bridge policy scholars worldwide. Notable among these is the Chinese Policy Scholars Group (CPSG), founded in 2017 through Chinese scholars' participation in the Association for Public Policy Analysis and Management (APPAM), which organizes conference panels, mentoring sessions, and collaborative research among China-focused policy scholars worldwide. The Section on Chinese Public Administration (SCPA) of the American Society for Public Administration (ASPA) and its affiliated journal, *Chinese Public Administration Review* (CPAR), provide an institutionalized venue for scholarly exchange between Chinese and international researchers. The China-America Association for Public Affairs (CAAPA), which co-organizes international conferences, such as the Global Urban Governance and Policy Conference, facilitates cross-border research and professional dialogue. These networks play an increasingly vital role in helping Chinese policy scholars engage with global academic norms, develop co-authorships, and contribute to comparative policy research efforts.

Beyond these formal associations, transnational collaboration initiatives linking China with the Global South and Western institutions have become increasingly prominent. For example, the China-Africa Knowledge Project (CAKP), coordinated by the Social Science Research Council (SSRC), facilitates multiyear collaborative research on China-Africa engagement, pairing China and African scholars to examine governance and development dynamics across regions. Similarly, the China-Global South Project (CGSP) fosters knowledge exchange on energy, climate governance, and development finance, advancing South-South cooperation through a China-centered but globally connected framework.

These collaborative endeavors demonstrate that Chinese policy scholars are becoming active participants in transnational research ecosystems. Yet bibliometric evidence still indicates that, while China's overall participation in international collaborations has expanded significantly, Chinese scholars often occupy fewer lead author or project leadership positions than their Western peers, reflecting persistent structural asymmetries in networked research influence (Wu et al., 2024).

Academic exchange programs also serve as one of the key tools for promoting cross-cultural understanding and fostering international research collaboration. According to Patricio et al. (2018), faculty exchange programs provide numerous mutual opportunities for both host and visiting faculty members to expand their research collaborations and to experience a different academic environment. Similar findings were observed by Mashizume et al. (2020), who categorized cross-cultural academic exchange programs' outcomes into four categories, namely "experience, reaction, learning, and behavior." The "experience" outcome captured participants' general impressions

and challenges faced, "reaction" evaluated their reflection on cultural differences, "learning" measured the extent to which new skills were developed, and "behavior" assessed the changes in professional behavior. The study also highlighted that even short-term international academic exchange programs can lead to positive changes in participants' personal and professional growth (Mashizume et al., 2020; Witchger, 2015). Overall, a substantial body of research suggests that international academic exchange programs offer significant benefits to their participants. By participating in such programs, faculty members not only advance their personal academic growth but also strengthen institutional ties and promote long-term scholarly engagement and collaboration (Andújar et al., 2015; Bauder, 2015; Bettmann & Prospero, 2012; Hoffman, 2009).

Joint research initiatives create an immense potential for advancing global policy research. For instance, the challenges created by the COVID-19 pandemic have become one of the vivid examples that highlighted the urge for global cooperation to ensure that world communities are able to adopt effective policies to cope with existing and emerging issues (Bennett & Howlett, 1992; Dunlop et al., 2020). This need for collaboration has underscored the value of joint cross-cultural research initiatives, as they not only provide immediate solutions but also contribute to long-term advancements in understanding policy processes. Through these collaborations (joint cross-cultural research initiatives and social interactions), researchers and policymakers can create a diverse mixed-opinion platform that fosters policy learning and policy change, as well as strengthens the connection between the two in the global arena (Dunlop & Claudio, 2022; Moyson et al, 2017). This exchange of perspectives and experiences can help better facilitate the refinement and improvement of existing policy frameworks and theories and enhance the ability to address complex policy challenges (Das et al., 2024; Dusdal & Powell, 2021; Lee at al., 2020).

Collaboration enhances and improves research methods, the foundation of academic inquiry in any field, ensuring that scholars representing diverse communities are enabled to provide meaningful and generalizable inferences to address the complexities of the challenges that exist in public policy research today (Howlett et al., 2017). While traditional research methods have been widely used and proved to be successful, their advancement and the creation of new methods are important to provide innovative solutions to "wicked" problems (Perry & Kenneth, 1986; Sorensen & Torfing, 2018). Jukic et al. (2019) emphasizes the idea of collaborative innovations focusing on the process rather than the outcome by stating that they do not necessarily lead to immediate and automatic improvements; however, they provide opportunities for solving problems in new and different ways. In addition to advancing research methods, cross-cultural collaboration between scholars enhances their understanding of each other's research environments and creates a

stronger understanding of the existing methods that can further be applied across new policy domains and in different cultural settings (Broesch et al., 2020; Urassa et al., 2021).

Overcoming linguistic barriers and developing specific academic language skills can significantly expand the presence of Chinese and other non-Western policy researchers in the global policy arena. As linguistic barriers often cause a noticeable underrepresentation for non-English-language speaking communities and create serious consequences for building an equitable dialogue in the global policy community, the idea of cross-national collaboration becomes even more prominent (Amano et al., 2021; Carlsson et al., 2024). Even though the existence of such tools as generative AI can help solve some of the issues associated with the lack of the necessary academic language skills, scholars should remain mindful about the potential consequences the use of such tools may have on their work and continue to uphold the highest ethical and professional standards of the field (Kim et al., 2023; Liebrenz et al., 2023). Taking a more proactive approach, such as international and domestic training, despite it being more time-consuming, is hypothesized to yield much better outcomes in the long term (Li & Hu, 2017).

Conclusion

The trajectory of policy research in China has been marked by significant progress, yet substantial challenges remain. Chinese scholars have increasingly contributed to the global policy discourse, demonstrating both empirical sophistication and theoretical engagement. However, persistent structural and individual-level constraints continue to limit their full integration into international academic networks. Barriers, including the difficulty of publishing in English-language journals, uneven access to research funding, and institutional pressures that prioritize domestic over international scholarship, have slowed the pace of global engagement. Structural challenges, ranging from high teaching loads to limited cross-border collaborations, further exacerbate these difficulties, creating obstacles that scholars must navigate in their pursuit of impactful policy research.

Despite these constraints, the future of Chinese policy scholarship holds immense promise. The evolving academic landscape, coupled with increased government support for internationalization and the expansion of research institutions, presents opportunities for growth and deeper integration into global policy studies. To harness this potential, policy scholars, institutions, and academic networks must work toward cultivating a more inclusive, collaborative, and globally engaged research environment.

Bridging policy research across national borders is essential for overcoming current research constraints. As policy issues become increasingly globalized, knowledge exchange and collaboration between scholars in China, the Global South, and Western in-

stitutions will be critical to developing effective policy solutions. The challenges facing modern governance—ranging from climate change and economic inequality to technological innovation and social justice—demand not only rigorous academic inquiry but also sustained collaboration that transcends national and disciplinary boundaries. Policy research collaborations, both among nations within the Global South and with institutions in the West, are essential for crafting policies that reflect the complexity of our shared challenges. By leveraging these collaborative opportunities, we can integrate diverse perspectives, enhance methodological innovation, and ensure that policy research is both globally informed and locally relevant.

One of the most pressing imperatives for the future is fostering structured and sustained research collaborations. Just as stakeholder networks enhance policymaking by fostering trust and facilitating knowledge-sharing, research networks strengthen policy scholarship by integrating diverse theoretical perspectives and empirical approaches. Establishing formal partnerships between Chinese universities and leading global policy schools could provide the intellectual infrastructure necessary for long-term academic cooperation. Initiatives such as co-authored research projects, faculty and student exchange programs, and joint conferences can serve as powerful mechanisms for overcoming institutional barriers and ensuring that Chinese scholars have the resources and networks needed to thrive in the global academic arena.

Expanding comparative policy studies is another crucial step toward global engagement. While Chinese scholars have increasingly engaged with Western policy theories, their contributions remain underrepresented in international policy debates. By deepening comparative research efforts—particularly through collaborations with scholars from the Global South—China can play a more central role in advancing policy theories that reflect governance realities across diverse institutional and political contexts. This expansion not only enriches global policy scholarship but also ensures that policy research better represents the plurality of governance approaches worldwide.

Investing in the next generation of policy scholars is equally critical. Academic institutions should prioritize mentorship programs, research funding initiatives, and professional development opportunities that equip young scholars with the skills necessary to engage in international policy discourse. Providing early exposure to global research networks through conference participation, collaborative projects, and visiting scholar programs can help bridge the gap between domestic and international policy research communities. By fostering a new generation of scholars' adept at navigating the complexities of global policy research, China can ensure that its policy scholars are at the forefront of theoretical innovation and empirical inquiry.

Furthermore, the Chinese academic community must continue refining institutional policies that incen-

tivize international publication while recognizing the value of cross-border collaborations. While domestic policy journals remain essential venues for national discourse, greater institutional support for global engagement—through targeted funding, tenure and promotion incentives, and reduced bureaucratic barriers—will be crucial in expanding the global reach of Chinese policy research.

Despite the challenges ahead, there is reason for optimism. The increasing presence of Chinese policy research in international journals, the rise of interdisciplinary and applied policy studies, and the willingness of scholars to engage in collaborative research all indicate that the field is on the brink of a new era of academic exchange. As policy challenges become more interconnected, the need for diverse, comparative, and globally integrated policy research has never been greater. Several policy domains stand out as particularly promising areas for collaboration between China, the Global South, and Western policy scholars. In climate governance, China's "pilot first, scale later" approach, exemplified by its carbon trading and green finance pilots, offers rich opportunities for comparative research on market-based environmental policy instruments (Cui et al., 2021; Zhang and Li, 2022). In public health and pandemic preparedness, collaborative studies could build on China's COVID-19 response and evolving role in global health governance to analyze crisis learning, intergovernmental coordination, and policy adaptation across political systems (Wei et al., 2024; Huang et al., 2024). Urban resilience presents another avenue for cooperation, linking China's resilient-city pilot programs to initiatives in other rapidly urbanizing regions (Bahadur and Tanner, 2021; Zhang et al., 2024). Meanwhile, digital governance and science and technology policy offer new frontiers for cross-regional comparison, as China's digital governance and data regulation frameworks continue to influence global debates on Artificial Intelligence (AI) ethics and digital infrastructure (Qiao-Franco and Zhu, 2024; Liu, 2021). Together, these policy domains illustrate how combining China's extensive policy experimentation and data resources with theoretical and methodological innovations from Western and Global South policy scholarship can broaden the empirical foundations of policy theory and foster a more inclusive and globally engaged policy research.

By taking advantage of the collaborative opportunities described, we can leverage our collective knowledge and expertise to overcome shared challenges and create a brighter future for all. The future of policy scholarship depends not only on individual efforts but on the collective will of scholars, institutions, and academic networks to build a research ecosystem that values inclusion, innovation, and cooperation. China stands at the threshold of becoming a leading force in policy studies, and through strategic collaborations, institutional reform, and investments in emerging scholars, Chinese researchers can play a defining role in shaping the next generation of global policy

scholarship. With deeper engagement, sustained partnerships, and a commitment to knowledge-sharing, the future of policy research in China and beyond holds extraordinary promise.

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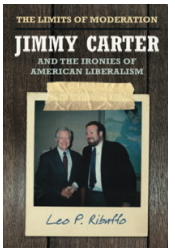

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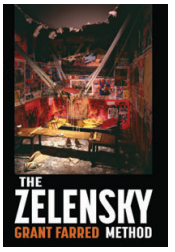

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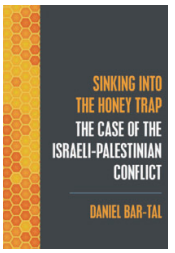
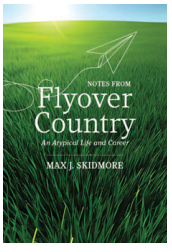


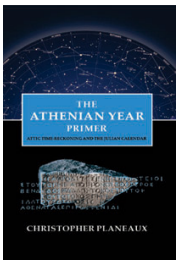
Sinking into the Honey Trap: The Case of the Israeli-Palestinian Conflict by Daniel Bar-Tal, Barbara Doron, Translator

Sinking into the Honey Trap by Daniel Bar-Tal discusses how politics led Israel to advancing the occupation, and of the deterioration of democracy and morality that accelerates the growth of an authoritarian regime with nationalism and religiosity.



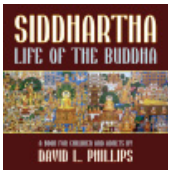
Notes From Flyover Country: An Atypical Life & Career by Max J. Skidmore

In this remarkable book, Skidmore discusses his "atypical life and career," and includes work from his long life in academe. Essays deal with the principles and creation of constitutions, anti-government attitudes, the influence of language usage on politics, and church-state relations.



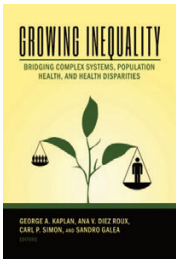
The Athenian Year Primer: Attic Time-Reckoning and the Julian Calendar by Christopher Planeaux

The ability to translate ancient Athenian calendar references into precise Julian-Gregorian dates will not only assist Ancient Historians and Classicists to date numerous historical events with much greater accuracy but also aid epigraphists in the restorations of numerous Attic inscriptions.



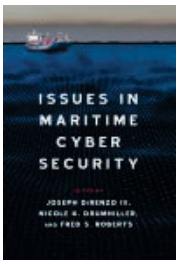
Siddhartha: Life of the Buddha by David L. Phillips, contributions by Venerable Sitagu Sayadaw

Siddhartha: Life of the Buddha is an illustrated story for adults and children about the Buddha's birth, enlightenment and work for social justice. It includes illustrations from Pagan, Burma which are provided by Rev. Sitagu Sayadaw.



Growing Inequality: Bridging Complex Systems, Population Health, and Health Disparities Editors: George A. Kaplan, Ana V. Diez Roux, Carl P. Simon, and Sandro Galea

Why is America's health is poorer than the health of other wealthy countries and why health inequities persist despite our efforts? In this book, researchers report on groundbreaking insights to simulate how these determinants come together to produce levels of population health and disparities and test new solutions.

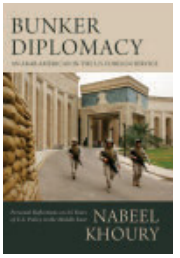


Issues in Maritime Cyber Security Edited by Dr. Joe DiRenzo III, Dr. Nicole K. Drumhiller, and Dr. Fred S. Roberts

The complexity of making MTS safe from cyber attack is daunting and the need for all stakeholders in both government (at all levels) and private industry to be involved in cyber security is more significant than ever as the use of the MTS continues to grow.

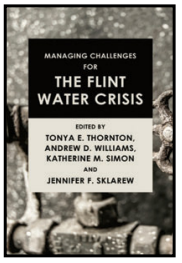
Female Emancipation and Masonic Membership: An Essential Collection By Guillermo De Los Reyes Heredia

Female Emancipation and Masonic Membership: An Essential Combination is a collection of essays on Freemasonry and gender that promotes a transatlantic discussion of the study of the history of women and Freemasonry and their contribution in different countries.



Bunker Diplomacy: An Arab-American in the U.S. Foreign Service by Nabeel Khoury

After twenty-five years in the Foreign Service, Dr. Nabeel A. Khoury retired from the U.S. Department of State in 2013 with the rank of Minister Counselor. In his last overseas posting, Khoury served as deputy chief of mission at the U.S. embassy in Yemen (2004-2007).



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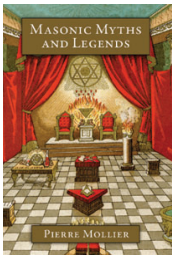
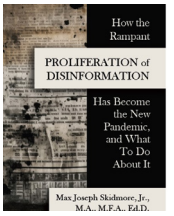
User-Centric Design by Dr. Diane Stottlemyer

User-centric strategy can improve by using tools to manage performance using specific techniques. User-centric design is based on and centered around the users. They are an essential part of the design process and should have a say in what they want and need from the application based on behavior and performance.



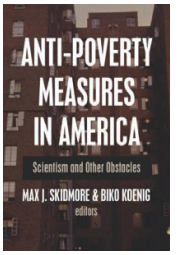
Masonic Myths and Legends by Pierre Mollier

Freemasonry is one of the few organizations whose teaching method is still based on symbols. It presents these symbols by inserting them into legends that are told to its members in initiation ceremonies. But its history itself has also given rise to a whole mythology.



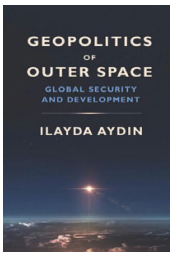
How the Rampant Proliferation of Disinformation has Become the New Pandemic by Max Joseph Skidmore Jr.

This work examines the causes of the overwhelming tidal wave of fake news, misinformation, disinformation, and propaganda, and the increase in information illiteracy and mistrust in higher education and traditional, vetted news outlets that make fact-checking a priority



Anti-Poverty Measures in America: Scientism and Other Obstacles
Editors, Max J. Skidmore and Biko Koenig

Anti-Poverty Measures in America brings together a remarkable collection of essays dealing with the inhibiting effects of scientism, an over-dependence on scientific methodology that is prevalent in the social sciences, and other obstacles to anti-poverty legislation.



Geopolitics of Outer Space: Global Security and Development
by Ilayda Aydin

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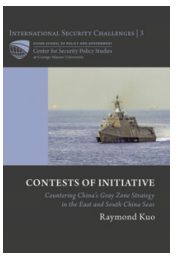
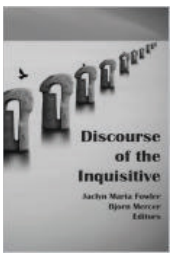


Contests of Initiative: Countering China's Gray Zone Strategy in the East and South China Seas
by Dr. Raymond Kuo

China is engaged in a widespread assertion of sovereignty in the South and East China Seas. It employs a "gray zone" strategy: using coercive but sub-conventional military power to drive off challengers and prevent escalation, while simultaneously seizing territory and asserting maritime control.



Discourse of the Inquisitive
Editors: Jaclyn Maria Fowler and Bjorn Mercer

Good communication skills are necessary for articulating learning, especially in online classrooms. It is often through writing that learners demonstrate their ability to analyze and synthesize the new concepts presented in the classroom.

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