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The Hand of the Market, the Way of Governance: Paradigm Innovation of Public Governance in China's Green Futures Practice

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Abstract

This paper uses the innovative practice of China's green futures market as a "small incision" to explore the "big issue" of financial markets as a tool for public governance from both theoretical and practical dimensions. Against the backdrop of the global sustainable development transformation, traditional "command-and-control" environmental regulations face efficiency bottlenecks and insufficient incentives. This paper argues that futures contracts are evolving from purely economic tools into "governance contracts" that carry public policy objectives. Through three core mechanisms—price discovery, risk management, and standard embedding—futures markets can internalize environmental externalities and provide dynamic, forward-looking incentive signals for sustainable development. The article provides an in-depth analysis of specific practices in areas such as new energy metals, green agricultural products, and the circular economy at futures exchanges in Guangzhou, Zhengzhou, and Shanghai, revealing their multi-dimensional governance value in serving the national "dual-carbon" goals, safeguarding industrial chain security, and promoting common prosperity. The study finds that this practice is a vivid embodiment of China's theory of combining an "effective market" with a "proactive government," forming a new paradigm of collaborative governance among top-level national design, market intermediary institutions, and micro-level market entities. Finally, the paper discusses the governance challenges this model faces, including data infrastructure, regulatory coordination, and participation equity, and proposes corresponding optimization pathways to provide theoretical references and policy insights for improving the sustainable financial governance system with Chinese characteristics and constructing an autonomous knowledge system of public administration.

Keywords: green futures; sustainable development; public governance; market-based environmental regulation; effective market; proactive government

1. Introduction: The New Frontier of Public Governance and the "Small Incision" Problem

1.1. Global Sustainable Development Transformation and Governance Dilemmas

Entering the 21st century, issues such as intensified climate change, tightening resource constraints, and social injustice have become increasingly prominent. Sustainable development has risen from a marginal environmental issue to a core agenda of global governance and a common value pursuit of human society. The goal of sustainable development is to "meet the needs of the present without compromising the ability of future generations to meet their own needs," with its connotation covering the three interrelated dimensions of environment, society, and economy—the so-called "triple bottom line" (Elkington 1997). This profound transformation not only requires a reshaping of the global economic structure but also poses fundamental challenges to traditional public administration theory and practice.

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For a long time, governments have primarily relied on "command-and-control" regulatory instruments to address externalities like environmental issues (Gunningham and Sinclair 2017). Such regulations directly intervene in the production and operation behaviors of market entities by setting uniform emission standards, technical specifications, or market access thresholds. While this approach has direct and clear advantages when dealing with extreme and urgent environmental problems, its drawbacks have become increasingly apparent. Its rigid "one-size-fits-all" characteristic not only incurs high regulatory costs but also, by ignoring the heterogeneity of different market entities, fails to effectively incentivize enterprises to engage in green technology innovation beyond compliance requirements. It may even harm market fairness due to rent-seeking and gaming during the regulation enforcement process (Yu and Chen 2010).

Traditional public administration theories, whether rooted in the classical Weberian bureaucratic model or the subsequent New Public Management (NPM) movement, appear inadequate when facing "wicked problems" like climate change, which are characterized by deep uncertainty, value conflicts, and complex cross-domain dependencies (Rittel and Webber 1973). These theoretical models often presuppose a clear boundary between the state as regulator and the market as the regulated. However, sustainable development precisely requires a new governance paradigm that blurs these traditional boundaries, one that is more collaborative, adaptive, and networked. As the global sustainable development agenda becomes increasingly complex and dynamic, the challenge of how to innovate public governance tools to guide massive social resources toward green, low-carbon, and inclusive areas with lower social costs, higher allocation efficiency, and stronger incentive compatibility has become a common governance challenge for governments worldwide. The essence of this challenge ultimately returns to the core proposition of public administration: how to define and optimize the relationship between government and the market (Lin 2012).

1.2. Research Entry Point: The Evolution from Financial Instrument to Governance Mechanism

Facing the aforementioned grand governance proposition, this paper selects China's burgeoning green futures market as a "small incision" to investigate this "big issue." This methodological choice is deliberate, aiming to ground a high-level theoretical debate about state-market relations in concrete empirical evidence. As a core component of the modern financial system, the traditional functions of the futures market are defined as price discovery and risk management (Hull 2019). However, as China elevates sustainable development to a national strategic level, the function of the futures market is undergoing a profound evolution. From agricultural futures serving the "Agricultural Power" strategy, to industrial product futures supporting the "Manufacturing Power" strategy, and now to new energy metal futures aiding the "Green Transformation," a series of futures product innovations closely aligned with national strategies reveal its great potential as a new type of public governance tool (China Futures Association 2024).

The core argument of this paper is that the practice of China's green futures is not merely a business innovation in the financial field but a profound governance paradigm shift. It is not a simple case of direct government intervention in the market, but rather a more sophisticated institutional design that internalizes the state's macro strategic goals (such as the "dual-carbon" targets, industrial chain security, and common prosperity) into the micro-incentive signals and business decision-making logic of market participants. In this process, the nature of futures contracts undergoes a fundamental evolution. When environmental standards are incorporated into the design of deliverable grades, and when the forward price curve reflects expectations of future green policies, futures contracts transcend their status as purely commercial agreements. They evolve into a new type of institutional arrangement that carries public policy objectives and executes public governance tasks through market transactions—a form of "governance contract."

This practice vividly interprets the governance philosophy of combining an "effective market" with a "proactive government" in the socialist market economy with Chinese characteristics (Xi 2020), surpassing the traditional "state-market" dichotomy prevalent in mainstream Western theory

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(Fligstein 2001). It demonstrates a unique path where the state does not intervene from outside the market but rather constructs and guides from within: the government sets the strategic direction, promotes semi-public institutions like exchanges to design financial products that embody the strategy, and ultimately relies on the market's own logic to achieve public goals. This provides an excellent analytical sample for understanding the modernization of state governance with Chinese characteristics and contributes to the construction of an autonomous knowledge system of public administration .

1.3. Research Framework and Structure

The structure of this paper is arranged as follows: Section 2 will construct an analytical framework that integrates market-based environmental regulation theory with the theory of Chinese state-market relations, arguing for the theoretical logic of the futures market's evolution from an economic tool to a governance mechanism. Section 3 will systematically analyze the governance innovation practices of China's green futures market, using the Guangzhou Futures Exchange as a representative case, through a "small incision" deep description. Section 4 will delve into its internal mechanisms, analyzing the transmission pathways and paradigm characteristics of its collaborative governance from economic, environmental, and social dimensions. Section 5 will objectively assess the challenges currently faced by this governance model and propose corresponding optimization paths. Finally, Section 6 will summarize the findings and extract the implications of the Chinese practice for public administration theory and global sustainable governance.

2. Theoretical Framework: The Futures Mechanism as a Market-Based Governance Tool

2.1. The Evolution of Environmental Regulation Theory: From the "Commanding Hand" to the "Market Hand"

The evolution of environmental regulation theory is essentially a process of continuous adjustment and deepening of the government-market relationship in the field of environmental governance. Early "command-and-control" regulation reflected the strong role of the government as the primary regulator, with its theoretical basis in correcting "market failure" caused by environmental externalities (Bator 1958). However, practice has shown that government, too, can face the dilemma of "government failure," such as information asymmetry, regulatory capture, and administrative inefficiency (Wolf 1979). The limitation of this "commanding hand" lies in its attempt to use uniform administrative directives to address heterogeneous market entities, which not only results in high total social abatement costs but also inhibits enterprises' motivation for technological innovation due to its lack of flexibility (Yu and Chen 2010).

To overcome these drawbacks, market-based environmental regulation theory emerged, with its intellectual origins traceable to A.C. Pigou and R.H. Coase (Pigou 1920; Coase 1960). Its core idea is to "internalize" environmental externalities into the production costs of enterprises by creating and utilizing price signals, thereby incentivizing firms to autonomously seek the lowest-cost pollution control path (Stavins 2003). Whether through levying environmental taxes (Pigouvian taxes) or establishing emissions trading systems (an application of the Coase theorem), these market-based "incentive hands" are generally considered more cost-effective and conducive to technological innovation compared to the "commanding hand" (Stavins 2003). They acknowledge and leverage the heterogeneity among enterprises, allowing those with lower abatement costs to reduce more emissions and benefit from market transactions, thus achieving set environmental goals at the lowest total social cost.

2.2. The Futures Market: A More Advanced Market-Based Governance Mechanism

If instruments like environmental taxes and spot carbon markets provide "static" or "near-term" pricing for environmental costs, then futures markets offer a more advanced, dynamic, and forward-

 doi:10.20944/preprints202510.0063.v1

looking market-based governance mechanism. Their uniqueness lies not only in solving the "spatial dimension" of resource allocation efficiency but also in profoundly intervening in the most intractable "time dimension" problem in environmental governance. The consequences of environmental problems such as climate change are long-term and lagging, while the behaviors of market entities (pursuing short-term profits) and government officials (subject to term limits) often tend to be short-term. This mismatch between "short-term behavior" and "long-term goals" is the core crux of sustainable governance (Giddens 2009).

The futures market effectively corrects this "myopia" through its unique intertemporal pricing mechanism. Its core governance functions can be understood on three interrelated levels:

Forward-looking Price Guidance: The futures market forms a forward price curve covering months or even years into the future through centralized, continuous open bidding (Fama 1970). This curve not only reflects current supply and demand fundamentals but, more importantly, aggregates the collective expectations and judgments of all market participants regarding future technological progress, policy changes, resource scarcity, and macroeconomic trends. For green industries, this forward-looking price signal acts as a "lighthouse," providing a valuable decision-making basis for green projects with long investment cycles and high uncertainty, guiding social capital to flow accurately toward directions aligned with long-term sustainable development goals. This effectively compensates for the failure of traditional financial markets in supporting green innovation (Mazzucato 2013).

Systematic Risk Management: The sustainable development transformation is inherently a process fraught with risks and uncertainties, including technological disruptions, industrial policy adjustments, and sharp commodity price volatility. These risks are key obstacles hindering enterprises from making long-term green investments. By providing standardized hedging tools such as futures and options, the futures market enables enterprises to lock in future costs or revenues, stabilize business expectations, and thus greatly enhance the resilience of the entire green industrial chain (Bartram et al. 2011). A market environment capable of effectively managing risks is an institutional prerequisite for incentivizing enterprises to shift from "passive compliance" to "active transformation."

Embedded Standard-Setting: This is the subtlety that distinguishes futures markets from other market-based tools. By embedding sustainability requirements such as green, low-carbon, and energy-saving criteria into the deliverable grade standards of futures contracts, the exchange effectively creates a market-based "certification" and "incentive" mechanism. Products that meet higher green standards gain a competitive advantage in the market because they possess delivery eligibility or can obtain a price premium. This "green premium" mechanism creates a self-purifying effect of "good money driving out bad," internalizing external regulatory requirements into the intrinsic motivation for enterprises to enhance their market competitiveness. This is a form of "soft regulation" or "embedded supervision" that is more cost-effective and efficient than administrative inspections.

2.3. Theoretical Integration in the Chinese Context: "Effective Market" and "Proactive Government"

Placing the above theories within China's unique governance context reveals a profound theoretical integration. The core of Chinese public administration theory and practice has always revolved around managing the relationship between the government and the market (Zhou 2007). Since the 18th National Congress of the Communist Party of China, it has been explicitly stated that "the market should play the decisive role in resource allocation and the government should play its role better" (CPC Central Committee 2013). This is not a simple zero-sum game but a relationship of dialectical unity and synergistic effort .

The combination of an "effective market" and a "proactive government" is fully reflected in the governance practice of green futures:

The "effective market" is manifested in the fact that once the institutional framework is established, core functions such as price discovery, risk management, and resource allocation are

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mainly achieved through the autonomous operation of the market mechanism. Enterprises' hedging decisions, the flow of capital, and the market premium for green standards are all spontaneously formed by countless decentralized market entities pursuing their own profit maximization, which ensures the efficiency and vitality of the governance process.

The "proactive government" plays the role of the architect of market order and the guide of public goals. Its role is not to directly intervene in prices or dictate resource allocation but is manifested at three key levels: First, as an institutional supplier, it creates and maintains a fair, transparent, and efficient futures market rule system through laws, regulations, and administrative approvals (La Porta et al. 1998). Second, as a strategic navigator, it clarifies the state's macro goals in sustainable development (such as the "dual-carbon" targets) through industrial policies and guidance, and directs the financial market to serve these goals, for instance, by supporting the Guangzhou Futures Exchange in building a green futures trading platform (GFEX 2023). Third, as a risk watchman, it establishes cross-departmental, cross-market regulatory coordination mechanisms to monitor and prevent potential systemic financial risks, ensuring that market innovation does not deviate from the path of stable operation (PBoC 2024).

2.4. Futures Exchanges as Quasi-Public Governance Entities

Within the synergistic framework of an "effective market" and a "proactive government," futures exchanges play a unique and critical role. They are neither purely government agencies nor ordinary commercial enterprises, but rather quasi-public governance entities situated between the two, which can be termed "hybrid organizations." In China, major futures exchanges are established with the approval of the State Council and are under the vertical and unified supervision of the China Securities Regulatory Commission (CSRC), which endows them with a strong public attribute .

The governance function of these exchanges is concentrated in their role as market "rule-makers" and "institutional engineers." The concept of the "governance contract" is only made possible by this unique institutional arrangement. Designing and listing a new futures product is essentially a highly complex institutional innovation project. Every step, from determining the underlying asset and designing contract terms to setting delivery standards and building a risk control system, contains profound governance considerations. For example, when designing the lithium carbonate futures contract, the Guangzhou Futures Exchange (GFEX) had to consider not only its financial attributes but also its role in serving the strategic security of the national new energy vehicle industry. The setting of its deliverable grades directly affects the production standards and technological paths of enterprises throughout the industrial chain (GFEX 2024). Therefore, the behavior of the exchange transcends pure commercial logic and becomes a key "transducer" for conveying the state's macro strategic intentions to micro-market behaviors. This perspective elevates the exchange from a passive trading platform to an active governance hub connecting the state and the market, which is key to understanding the financial governance system with Chinese characteristics. It reveals the central mechanism of the Chinese model: the state does not merely regulate the market from the outside; it shapes the very architecture of the market from within through these quasi-public intermediaries.

In summary, the governance practice of China's green futures can be understood as a creative combination of market-based environmental regulation theory and the theory of state-market relations with Chinese characteristics. It transcends the simple dichotomy of "government failure" and "market failure," exploring a new path of modern governance characterized by "empowerment through top-level national design, autonomous operation of the market mechanism, and collaborative governance by multiple entities."

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3. "Small Incision" Deep Description: The Governance Innovation Practice of China's Green Futures

The vitality of theory lies in practice. This section delves into the specific practices of China's green futures market, demonstrating through case studies of different exchanges the operational logic and governance effectiveness of the aforementioned theoretical framework. The cases selected are not merely a collection of examples but represent a sophisticated and differentiated portfolio of governance instruments, strategically deployed to achieve distinct policy objectives—industrial, environmental, and social—simultaneously.

3.1. Top-Level Design: The Resonance of National Strategy and Financial Policy

The development of China's green futures market is not a spontaneous product of the market but a strategic layout advanced in a planned and step-by-step manner under the clear guidance of top-level national design. Since the establishment of the "dual-carbon" goals (peak carbon emissions before 2030, carbon neutrality before 2060), how the financial system can serve this profound socio-economic transformation has become a core issue in public policy formulation.

The policy context clearly demonstrates this strategic transmission. In early 2025, the CSRC issued the Implementation Opinions on the Capital Market's Role in the 'Five Major Areas of Finance', explicitly placing "green finance" at the core. The document proposed to "develop more green and low-carbon futures and options products that meet the needs of real economic development" and specifically named its support for the Guangzhou Futures Exchange to build a "green futures trading platform" (CSRC 2025). Subsequently, the Guiding Opinions on Financial Support for New Industrialization, jointly issued by the People's Bank of China and six other departments, further emphasized the need to "improve the futures product system oriented by industrial needs, and promote the stable supply and price of bulk commodities." This again highlighted the key role of the futures market in safeguarding the supply chain security of national strategic industries and promoting green transformation (PBoC et al. 2025).These high-level policy documents collectively constitute the "baton" and "roadmap" for the development of the green futures market, ensuring that financial innovation resonates with the national sustainable development strategy.

3.2. Empowering Strategic Emerging Industries: The Guangzhou Futures Exchange's "Green Proving Ground"

As China's youngest futures exchange, the Guangzhou Futures Exchange (GFEX), established in 2021, was immediately entrusted with the strategic mission of serving green development and the construction of the Guangdong-Hong Kong-Macao Greater Bay Area, becoming a "proving ground" for China's green futures innovation (Guangdong Provincial Government 2021). This exchange exemplifies the use of futures for proactive industrial policy in emerging sectors. Its product layout closely revolves around the core raw materials of national strategic emerging industries such as photovoltaics and new energy vehicles, aiming to address two major pain points: severe price fluctuations and raw material supply security.

The futures and options products successively launched by GFEX, such as industrial silicon, lithium carbonate, and polysilicon, have constructed the most comprehensive new energy metal futures system in China. As shown in Table1, these products quickly exerted their governance functions as an industrial chain "stabilizer" and investment "weather vane":

Industrial silicon futures and options serve the photovoltaic and organic silicon industries. The photovoltaic industry is a pillar for achieving energy structure transformation, but the price of its upstream raw material, industrial silicon, fluctuates sharply. Industrial silicon futures provide an effective cost-locking tool for polysilicon producers. Data shows that the hedging coverage rate of some leading polysilicon enterprises has exceeded 40%, greatly stabilizing production, operation, and expansion expectations (GFEX 2024).

 doi:10.20944/preprints202510.0063.v1

Lithium carbonate futures and options directly target the core of the new energy vehicle industry—power batteries. As a key raw material for battery cathodes, the price of lithium carbonate experienced sharp rises and falls in a short period, severely disrupting the industrial chain order. After its launch, lithium carbonate futures quickly became the recognized pricing benchmark for the global lithium battery industry chain. Battery manufacturers can effectively manage procurement costs and stabilize end-product prices through buying hedges; upstream lithium salt producers can lock in profits and expand investment confidently through selling hedges; and battery recycling enterprises can use futures price signals to optimize procurement and sales rhythms, promoting the commercial operation of the resource recycling system. According to statistics, the hedging scale of some leading battery manufacturers has reached 30% of their annual production volume (SMM 2025).

These practices clearly show that the value of GFEX's new energy metal futures extends far beyond providing a financial hedging tool. From a public governance perspective, by providing an open, transparent, and authoritative forward price signal, they effectively reduce the internal transaction costs and external uncertainties of the entire strategic emerging industry, accelerate the industrialization process of key technologies, and provide solid financial infrastructure support for ensuring national energy security and achieving the "dual-carbon" goals.

Table 1. Analysis of the Governance Functions of GFEX's New Energy Metal Futures.

Product	Served Industry	Core Economic Function	Core Governance Function	Enterprise Application Data
Industrial Silicon	Photovoltaics, Organic Silicon	Lock in raw material costs, stabilize production profits	Ensure photovoltaic industry supply chain stability, support national clean energy strategy	Hedging coverage rate of polysilicon enterprises >40%
Lithium Carbonate	Power Batteries	Stabilize procurement costs, manage price risk	Maintain new energy vehicle industry security, promote industrialization of lithium resource recycling	Hedging scale of leading battery makers reaches 30% of annual output
Polysilicon	Photovoltaic Modules	Manage price fluctuation risk, guide long-term contract pricing	Enhance global pricing influence of China's PV industry, accelerate energy structure transformation	PV enterprises use futures prices to guide long-term contract pricing

Source: Compiled by the author, based on data from GFEX (2024) and SMM (2025) as cited in the source document.

3.3. Transforming Traditional Industries and Promoting the Circular Economy: Explorations by ZCE, DCE, and SHFE

In addition to forward-looking layouts in emerging industries, the futures market also plays an indispensable role in the transitional management of legacy sectors and the development of the circular economy. The practices of the Zhengzhou Commodity Exchange (ZCE), the Dalian Commodity Exchange (DCE), and the Shanghai Futures Exchange (SHFE) demonstrate different governance paths.

ZCE's "Standard Implantation" Model: ZCE's innovation lies in skillfully "implanting" environmental regulatory requirements into the design of futures contracts. Taking rapeseed oil futures as an example, the exchange revised delivery rules to grant delivery convenience or price premiums to rapeseed oil produced using more energy-efficient and environmentally friendly processing technologies (ZCE 2023). This seemingly minor technical adjustment embodies a profound governance logic: it transforms the abstract requirement of "environmental protection" into a "market advantage" that enterprises can clearly perceive. To gain a more favorable position in futures delivery, enterprises are incentivized to proactively invest in energy-saving technological transformations. This market-based incentive, which changes the dynamic from "compelled to comply" to "I want to comply," significantly reduces the government's administrative supervision

 doi:10.20944/preprints202510.0063.v1

costs. Data shows that in 2023 alone, this measure led to a significant decrease in energy consumption in related industries. The cumulative delivery volume of rapeseed oil futures in the same year reached 309700tons, demonstrating the market's high recognition of the green standard (ZCE 2024).

DCE and ZCE's "Whole Industrial Chain Risk Management" Model: DCE and ZCE provide a "safety cushion" for the smooth green transformation of traditional high-energy-consuming industries by constructing complete chemical product futures chains. By listing upstream raw material futures such as pure benzene and propylene, which are linked with existing downstream product futures like styrene and polypropylene, chemical enterprises can conduct systematic joint hedging for the entire chain from raw material procurement to product sales . Against the backdrop of energy transformation and increasingly strict environmental requirements, traditional industries face enormous operational uncertainties. This model provides valuable certainty for enterprises through financial tools, enabling them to stabilize operations, avoid production interruptions and even large-scale unemployment caused by sharp price fluctuations, and ensure economic and social stability during the green transformation process. Data shows that with the support of futures tools, green technology transformation investment in the chemical industry achieved significant year-on-year growth in 2024, much higher than the average for the manufacturing industry, fully demonstrating that effective risk management is the source of confidence for enterprises to make long-term green investments (Shanghai Securities News 2023).

SHFE's Exploration of ESG Performance Incentives: Research on the impact of price fluctuations of crude oil futures at the Shanghai International Energy Exchange (INE, subordinate to SHFE) on the environmental, social, and governance (ESG) performance of enterprises in the same industry indicates that firms strategically improve their ESG performance in response to crude oil futures price shocks (D. Zhang et al. 2024). This suggests that the futures market not only reflects commodity prices but can also incentivize enterprises to pay more attention to and improve their sustainable development performance through market signals.

3.4. Practicing Inclusive Growth: "Insurance + Futures" as an Inclusive Finance Tool

The governance value of the futures market is not only manifested at the macro industrial level but also penetrates into the "capillaries" of the social structure through the innovative "Insurance + Futures" model, which serves as a tool for social policy and redistribution. This model practices the principles of inclusivity and fairness central to sustainable development.

The core logic is that an insurance company designs a product for farmers that guarantees the price of agricultural products. The insurance company then hedges the price risk it undertakes by purchasing corresponding exchange-traded options and other tools in the futures market (Luo and Zhong 2020). For individual farmers, the threshold for directly participating in complex futures trading is prohibitively high. The "Insurance + Futures" model cleverly packages the professional risk management function of the futures market into a simple and understandable insurance product, delivering it precisely to agricultural producers who need risk protection the most. This is a typical practice of inclusive finance and an innovative exploration by the government to provide quasi-public goods (risk protection) to dispersed and vulnerable social groups through market mechanisms (Beck et al. 2007).

Its social effectiveness is significant. Taking the apple project in Fu County, Shaanxi as an example, with the support of ZCE, the project covered 1793 fruit farmers, including over 28% who were registered impoverished households. When the market price of apples fell, the project ultimately paid out 18 million RMB to the farmers, with a payout ratio as high as 131% and an average payment of nearly 10,000 RMB per household, effectively stabilizing their income (Founder CIFCO Futures 2019). The apple project in Jingning County, Gansu was even larger, with a total payout exceeding 40.76 million RMB and a payout ratio of 180.69%, resulting in an average payment of over 6900 RMB per household, becoming a classic case of serving rural revitalization (Nanhua Futures 2023). This model not only stabilizes farmers' income and enhances their ability to cope with market price fluctuations and natural disasters, but more importantly, it closely connects the outcomes of

 doi:10.20944/preprints202510.0063.v1

modern financial markets with the well-being of the grassroots level of society, vividly interpreting the profound connotation of financial services serving the national strategy of "common prosperity."

4. Mechanism Analysis: The Collaborative Governance Logic of China's Green Futures Practice

The previous section described the diverse landscape of China's green futures market. This section aims to delve into its internal mechanisms, systematically analyzing its transmission pathways as a new type of governance tool from economic, environmental, and social dimensions, and extracting its unique collaborative governance paradigm.

4.1. Economic Dimension: Transmission from Price Signals to Industrial Chain Resilience

The economic contribution of the futures market to sustainable development first generates a "multiplier effect" through its powerful price signaling function. The "green premium" formed by green futures varieties—that is, the market-based price advantage obtained by products meeting sustainable standards—not only directly incentivizes the green transformation of individual production enterprises but also leverages transmission along the industrial chain to channel larger-scale social capital toward green sectors (Hong and Kacperczyk 2009). When capital markets observe that green assets can achieve better liquidity and price discovery through the futures market, their inclination to allocate to related assets increases. By the end of 2024, China had 350 green-themed funds with a total scale exceeding 310 billion RMB. The investment decisions of these funds largely refer to the price signals provided by the futures market, forming a capital guidance closed loop from the financial market to the real industry (Asset Management Association of China 2024).

Secondly, the risk management function of the futures market acts as an industrial chain "stabilizer." Against the backdrop of increasing global economic uncertainty and normalized fluctuations in commodity prices, the risks faced by the green transformation are particularly prominent. By providing a rich array of hedging tools, the futures market enables enterprises to convert uncertain price risks into certain operating costs, thereby stabilizing production plans, investment expectations, and employment (Stulz 1996).1 The "certainty" provided to microeconomic entities aggregates into the resilience of the macroeconomy and industrial chains. It ensures that during the transition to a sustainable development model, the economic system can withstand external shocks and achieve a smooth transition, avoiding severe economic fluctuations caused by transformation pains.

4.2. Environmental Dimension: "Twin Engines" of Market Incentives and Environmental Regulation

In the environmental dimension, the core governance mechanism of the green futures market lies in the effective internalization of environmental costs. Taking the actively researched carbon emission allowance futures as an example, it prices the core environmental element of "carbon" through market transactions, making the cost of carbon emissions—previously ignored by enterprises and society—explicit and asset-like (Qi and Lin 2018). Once carbon emission allowances have a continuous and transparent forward price curve, they are no longer abstract environmental slogans but assets or liabilities that must be meticulously managed on the enterprise balance sheet. This will fundamentally change enterprise behavior patterns, incentivizing them to view emission reduction as an investment that creates economic value, rather than merely a compliance cost (CNEER 2025).

Furthermore, the development of futures markets makes a more efficient and refined "twin-engine" environmental governance model possible. This cross-market linkage provides policymakers with an innovative regulatory lever. For instance, regulatory authorities could construct a synergistic "dual-market linkage" governance mechanism: when monitoring indicates that carbon market prices are too low and emission reduction constraints are insufficient, they could appropriately increase the margin requirements or transaction fees for high-carbon variety (e.g., coal) futures, transmitting a

 doi:10.20944/preprints202510.0063.v1

tightening signal to the real industry through the futures market. Conversely, when larger-scale emission reductions need to be incentivized, both market tools can be used synergistically. This dynamic, synergistic regulation based on market signals is undoubtedly more flexible, efficient, and precise compared to traditional, static administrative orders.

4.3. Social Dimension: Reshaping from Consumer Welfare to Corporate Governance

The governance value of the futures market ultimately transmits to the social level, reflected in the promotion of social fairness and the reshaping of corporate governance.

First, by stabilizing upstream raw material prices, the futures market acts as a "buffer" for protecting consumer welfare and maintaining social stability. For example, the smooth operation of basic chemical raw material futures like pure benzene and propylene provides price risk management tools for downstream consumer goods industries such as plastics, textiles, and daily chemicals. This effectively suppresses sharp rises and falls in terminal consumer prices caused by drastic fluctuations in raw material prices, thus protecting the immediate interests of the general public under inflationary pressure . Meanwhile, as mentioned earlier, inclusive finance models like "Insurance + Futures" extend the risk protection function of financial markets to vulnerable groups, promoting the fair accessibility of financial services, which is an important institutional arrangement for achieving inclusive growth (Beck et al. 2007).

Secondly, participation in the futures market profoundly promotes the modern transformation of corporate governance structures. Once enterprises incorporate futures tools into their daily operational decisions, their governance philosophy undergoes a systematic shift. First, the decision-making perspective becomes long-term, shifting from chasing short-term spot price fluctuations to managing long-term risks and opportunities based on the forward price curve. Second, the risk management system becomes systematic, with futures hedging integrated into the enterprise's comprehensive risk management framework, enhancing the scientific nature and robustness of operations. Third, environmental investment becomes strategic; as green production can bring tangible economic returns through the futures market, environmental investment transforms from a passive cost item into an active strategic choice to enhance core competitiveness (Tianjin Discipline Inspection Commission 2025). These micro-level governance transformations aggregate to form a solid foundation for the evolution of the entire society toward a sustainable development model.

4.4. A New Paradigm of Collaborative Governance

Synthesizing the above analysis, it becomes evident that behind the practice of China's green futures lies a unique, tripartite interactive collaborative governance paradigm involving the state, the market, and society.

In this paradigm, the State (government) plays the role of "top-level designer" and "ultimate regulator," responsible for setting macro strategic goals and providing the institutional foundation (Evans 1995). TheMarket (intermediaries represented by exchanges and futures companies) plays the role of "institutional executor" and "mechanism innovator," accurately "translating" macro policy intentions into specific, tradable, and hedgeable market rules and financial products. Society (micro entities represented by enterprises and farmers), as "active responders" and "value creators," autonomously engages in green innovation and sustainable practices incentivized by market signals. These three parties perform their respective duties while empowering each other, forming a governance ecosystem that is more resilient and adaptive than the simple binary relationship of "regulator" and "regulated."

This paradigm transcends the traditional principal-agent supervision model. The government is no longer merely a principal issuing commands but acts as a "meta-governor," shaping the institutional environment and strategic direction. This governance model of "embedded autonomy" (Evans 1995), where the state is deeply embedded in market operations through institutions like exchanges while maintaining the strategic autonomy to guide the market toward long-term national

 doi:10.20944/preprints202510.0063.v1

goals, provides a fruitful Chinese solution for addressing complex governance challenges like sustainable transformation.

5. Progressing with Stability: Challenges and Optimization Paths for Sustainable Governance

Although China's green futures market has achieved remarkable results in serving sustainable development, as an emerging field of governance, its steady progress still faces multiple challenges at the levels of its governance foundation, framework, and objectives. Identifying and addressing these challenges is a necessary path to constructing a modern sustainable financial governance system.

5.1. Foundational Challenges: Data Deficit and Information Asymmetry

The accurate pricing and effective operation of green futures are highly dependent on high-quality, standardized, and verifiable environment-related data, such as corporate carbon emissions, energy consumption, and pollutant emissions (Zeng and Kang 2020). However, China's environmental data infrastructure is still relatively weak, with a significant "data deficit." Specific manifestations include inconsistent data standards, differing statistical calibers, barriers to cross-departmental data sharing, and the need to improve the real-time nature and accuracy of data. For example, during the research and development of power futures, GFEX faced challenges such as fragmented regional power data and difficulties in accurately measuring the value of electricity from different energy structures (Zeng and Kang 2020). Similarly, the launch of carbon emission allowance futures urgently requires a perfected Monitoring, Reporting, and Verification (MRV) system for emission data as support (IIGF 2024).

From the perspective of public governance theory, high-quality environmental data has typical public good attributes. Individual enterprises lack sufficient incentive to produce and share this data, easily leading to an insufficient supply within the market. The lack of underlying data not only affects the scientific basis of futures contract design and the effectiveness of pricing but also exacerbates information asymmetry, providing opportunities for "greenwashing" behavior, where enterprises may misreport their sustainability performance to obtain improper benefits, thereby damaging market credibility and resource allocation efficiency (Delmas and Burbano 2011).

5.2. Framework Challenges: Regulatory Innovation and Efficient Coordination

As a cross-border innovative governance tool, the regulatory demands of green futures also transcend the scope of traditional financial regulation, posing challenges to the current regulatory framework. Currently, China's futures regulatory system is primarily designed for traditional bulk commodities, with insufficient consideration for the particularities of environmental rights-based futures . This "regulatory demand" is mainly reflected in three aspects:

Establishment of Cross-Departmental Coordination Mechanisms: The regulation of green futures, especially carbon emission allowance futures, involves multiple departments such as the CSRC (financial market regulation), the Ministry of Ecology and Environment (environmental rights certification), and the National Development and Reform Commission (energy and industrial policy). Without an efficient, regularized cross-departmental collaborative decision-making and information-sharing mechanism, policy conflicts or regulatory vacuums can easily occur, leading to a "fragmented governance" dilemma .

Formulation of Cross-Border Regulatory Rules: With the continuous opening of China's financial market, there is an urgent need to fill the institutional gap regarding how to effectively coordinate domestic and foreign regulatory rules for green-related varieties with a high degree of internationalization (e.g., platinum, palladium), facilitate participation by foreign investors, and prevent cross-border capital flow risks (Zetzsche et al. 2017).

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Strengthening ESG Regulatory Coordination: The green standard-setting of the futures market has not yet formed an effective connection with regulatory systems in other sustainable finance areas, such as the ESG information disclosure of listed companies, green bond certification, and green credit standards, making it difficult to exert policy synergy (GFEX 2025).

5.3. Objective-Related Challenges: Participant Imbalance and Insufficient Inclusivity

From the perspective of governance goals, an ideal green futures market should have inclusive risk management functions, and its development outcomes should be widely shared by all sectors of society. However, current market practices show a tendency toward structural imbalance, with insufficient participation by real-economy enterprises, especially small and medium-sized enterprises (SMEs). Research indicates that many SMEs find it difficult to effectively use futures tools for hedging due to a lack of professional talent, limited financial strength, and weak risk management awareness .

This imbalance in participant structure may lead to two negative consequences. First, insufficient participation by real-economy enterprises, particularly SMEs, may harm the effectiveness of the price discovery function, causing futures prices to deviate from industrial fundamentals and expanding basis risk, which in turn creates problems for these enterprises. Second, it weakens the inclusivity of governance, preventing the quasi-public good of risk management from fully benefiting the groups that need it most, which, to some extent, deviates from the governance goals of "common prosperity" and inclusive growth. According to related research, the actual participation rate in hedging by SMEs in China's commodity futures market is generally below 20%, far lower than that of large enterprises.

5.4. Optimization Paths: Building a Modern Sustainable Financial Governance System

To address the above challenges, it is necessary to systematically propose optimization paths from the perspective of modernizing the national governance system and governance capacity:

Consolidate Data Infrastructure and Strengthen Public Goods Supply: It is recommended that the national level take the lead in building an authoritative, unified "National Green Data Infrastructure Platform," integrating data resources from departments such as energy, environmental protection, meteorology, and industry and information technology, and establishing standardized data sharing and disclosure mechanisms. Technologies like blockchain can be used to ensure data authenticity and traceability. The government should bear the core responsibility for providing this key public good, laying a solid foundation for the effective operation of the market (Zeng and Kang 2020).

Innovate Regulatory Tools and Enhance Governance Adaptability: In the face of rapid financial innovation, the regulatory system needs to shift from "control-based" to "adaptive." It is recommended to introduce a "regulatory sandbox" mechanism to provide a risk-controlled testing environment for major innovative products like carbon futures and power futures (Zetzsche et al. 2017). Simultaneously, a specialized "Green Futures Product Regulatory Guideline" should be formulated as soon as possible, and a regularized cross-departmental coordination and deliberation mechanism should be established. Regarding opening up, innovative arrangements such as "cross-border mutual recognition of green certificates" can be piloted, relying on institutional highlands like the Guangdong-Hong Kong-Macao Greater Bay Area to steadily enhance the market's level of internationalization (Z. Zhang 2019).

Develop an Inclusive Market Ecology and Unify Efficiency and Fairness: To address the participation imbalance, collaborative efforts from the government, exchanges, and market institutions are needed. Exchanges should continuously optimize contract design, for example, by promoting the experience of GFEX's platinum and palladium futures, which allow multiple forms of delivery, to lower the participation threshold for SMEs (GFEX 2025). More importantly, the "Futures Social Worker" service model should be vigorously developed and promoted. This model draws on the concept of social work, where professional institutions like futures companies form service teams to go deep into industrial clusters and SMEs, providing customized, accompanying risk management

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training and solution design. This model is an innovative extension of the "service-oriented government" concept in the financial field. The government can support it through measures like purchasing services and providing subsidies, precisely "drip-irrigating" professional financial services to the capillaries of the economy and ensuring that the fruits of sustainable development benefit a broader range of social groups (Luo and Zhong 2020).

6. Conclusions: Implications of the Chinese Practice for Public Administration Theory

6.1. Responding to the "Big Question": Re-Evaluating the Value of Futures Markets as Governance Tools

Using the innovative practice of China's green futures market as a "small incision," this paper has deeply explored the "big question" of the role financial markets play in the modern state governance system. The core finding is that the futures market is far from being merely a resource allocation venue in the traditional economic sense; it is evolving into a sophisticated governance tool capable of carrying and achieving complex public goals. Through a systematic analysis of the Chinese practice, this paper has demonstrated the three key roles played by the futures market in sustainable development governance:

A "steering wheel" for strategic guidance: Through its forward-looking price discovery function, it provides clear market signals for long-term social capital investment in green and low-carbon fields, effectively guiding the direction of economic structure transformation (Fama 1970).

An "accelerator" for industrial transformation: Through its systematic risk management function, it provides a "safety cushion" for enterprises experiencing transformation pains, enhances industrial chain resilience, and enables them to undertake long-term green technology innovation and investment (Bartram et al. 2011).

A "stabilizing valve" for social risks: Through its standard embedding and inclusive finance functions, it promotes self-discipline in corporate behavior at low cost and, by stabilizing prices and safeguarding people's livelihoods, resolves potential social conflicts during the transformation process (Beck et al. 2007).

This series of findings has important implications for public administration theory. It requires us to broaden the traditional understanding of the "policy toolbox" and incorporate complex financial derivatives such as futures and options into the research scope of public governance. Future public administration research needs to more deeply explore the interaction mechanisms between the internal logic of financial markets and administrative behavior, analyzing how to more effectively design and use these market-based tools to achieve public interests.

6.2. The Uniqueness and Global Significance of the Chinese Model

The success of China's green futures practice stems from its unique "state-market" interaction model, which provides valuable experience for sustainable governance worldwide. This model is neither a simple free market nor state intervention in the Western context, but rather a new governance paradigm that can be summarized as "State-constituted Market Empowerment" .

In this paradigm, the core role of the "state" is to "constitute" rather than "replace." The government, through top-level design, clarifies strategic goals and provides key public goods such as the rule of law environment and data infrastructure, creating the preconditions for the birth and development of the market . Once the market framework is constituted, the "market" is fully "empowered," and its inherent efficiency, innovative vitality, and decentralized decision-making mechanisms are stimulated to explore the specific paths to achieve public goals in the most economical way. A symbiotic relationship of mutual embedding and mutual achievement is formed between the state and the market (Evans 1995).

This model provides important inspiration for developing countries exploring their own modernization paths. In the wave of globalization and marketization, how to fully utilize global financial markets to serve their own sustainable development goals while adhering to national

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strategic autonomy and effectively preventing financial risks is a universal challenge. The practice of China's green futures provides a "Chinese solution" for reference, one that is distinct from both neoliberalism and traditional statism.

6.3. Avenues for Future Research

As a preliminary exploration, this study opens up several directions worthy of in-depth future research:

Deepening Theoretical Research: The concept of the "governance contract" proposed in this paper requires further theoretical explanation and academic construction. Future research can conduct more systematic studies on its connotation, characteristics, and operational mechanisms from perspectives such as contract theory, public economics, and administrative law (Hull 2019).

Expanding Practical Fields: With the emergence of more new products involving public goods and public risk management, such as electricity futures, data futures, and weather index futures, whether the governance analysis framework proposed in this study has universality and how it should be adjusted according to the characteristics of different fields are highly practical research topics (Zeng and Kang 2020).

Strengthening International Comparison: Systematic comparative studies between China's green futures practice and other economies' market-based environmental governance practices, such as the EU Emissions Trading System (EU-ETS) and the US Regional Greenhouse Gas Initiative (RGGI) (Ellerman et al. 2010), will help to more profoundly understand the advantages, disadvantages, applicable conditions, and evolution paths of governance models under different institutional environments, thereby contributing more universal knowledge to global sustainable governance.

In conclusion, as the sustainable development transformation enters a deep-water zone, innovating public governance tools has become a requirement of the times. The exploration of China's green futures not only injects new momentum into its own high-quality development but also provides an answer full of Eastern wisdom for the world on how to use the "hand of the market" to practice the "way of governance."

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