



# Research on Theoretical Innovation and Practical Pathways for High-Level Opening of China's Financial Sector a Synergistic Perspective on Institutional Opening and Risk Prevention and Control

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**Abstract.** In the context of deepening economic globalization, financial openness has emerged as a critical pathway for enhancing national competitiveness. Over the past four decades of reform and opening-up, China has transitioned from a closed economic system to an open one. However, in pursuing high-level financial openness, it continues to face challenges such as exchange rate fluctuations, debt risks, and the regulation of cross-border data flows. This paper begins by exploring the synergistic mechanism between institutional innovation and risk control, constructing a multi-dimensional research framework. It addresses theoretical gaps in areas such as digital financial openness and the mutual recognition of green standards, providing practical guidance for improving the efficiency of cross-border capital flow regulation and enhancing the global competitiveness of local financial institutions. Given the limitations of existing research methods in addressing the complexities of financial openness—such as the idealized tendencies of dynamic simulation models, the singular scenarios of stress testing methods, and bottlenecks in data collection—this paper proposes the construction of a "dynamic adaptation" capability. This capability emphasizes the flexible combination of policy toolkits and risk control through a "progressive innovation" approach. Simultaneously, it advocates for the establishment of a new model that encompasses institutional resilience, technological empowerment, and risk buffering across three dimensions, thereby providing a better explanation for innovative practices like pipeline-style openness. This framework offers theoretical support and practical guidance for a financial openness model with Chinese characteristics and serves as a significant reference for restructuring the international financial governance system, particularly in the realms of digital financial infrastructure, the development of green financial standards, and the establishment of regional financial cooperation mechanisms.

**Keywords:** High-level Financial Openness; International Competitiveness; Cross-border Investment and Financing; RMB Internationalization; Financial Security

# 1 Introduction

## 1.1 Research Background and Significance

Against the backdrop of deepening global economic integration, advancing the opening-up of the financial sector has emerged as a crucial strategic choice for countries aiming to enhance their comprehensive strength. As the world's second-largest economy, China has, through over four decades of reform and opening-up practices, achieved a remarkable transition from a closed economic system to an open one. Its total volume of commodity trade and the scale of international reserves both rank among the top globally, thereby validating the fundamental economic principle that 'openness promotes development' [1]. In light of profound adjustments in the global industrial value chain and the disruptive impact of digital technologies on the financial sector, the traditional model of financial openness faces unprecedented challenges. Emerging market countries are generally experiencing dual pressures from sharp exchange rate fluctuations and rising debt risks while promoting the convertibility of capital accounts. Notably, the scale of abnormal cross-border capital flows in 2022 increased by nearly 200% compared to 2012. Simultaneously, emerging areas such as digital finance and sustainable finance have yet to establish a unified international standard system, and regulatory rules governing cross-border data flows are increasingly becoming a core issue in international competition. China's implementation of high-level financial openness holds profound strategic significance. At the National Financial Work Conference, the strategic deployment of orderly promoting institutional openness was established as the core guiding principle. Through innovative financial connectivity mechanisms such as 'Bond Connect' and 'Cross-border Wealth Management Connect,' China has achieved an average annual growth rate of 15% in attracting foreign direct investment over the past three years, with the total amount of RMB-denominated financial assets held by overseas investors exceeding 10 trillion yuan. However, several contradictions remain to be resolved in practice: the construction of the financial security system lags behind the pace of openness, the cross-border payment system is overly dependent on the US dollar, and regional financial cooperation mechanisms have yet to establish an effective risk-sharing framework. These structural contradictions constrain the effective implementation of the new development paradigm of 'dual circulation,' while also placing significant transformation and upgrading pressures on small and medium-sized financial institutions in an open competitive environment [2].

In response to the practical challenges encountered during the deepening phase of financial openness, this study originates from the synergistic mechanism of institutional innovation and risk control to construct a multidimensional research framework. Theoretically, it innovatively establishes a 'dual-pillar' model, effectively addressing the theoretical gaps in research areas such as the digital financial openness system and the mutual recognition mechanism of green standards. Practically, it offers guidance for enhancing the macro-prudential regulatory efficacy of cross-border capital flows and bolstering the global competitiveness of domestic financial institutions [3]. Currently, at a pivotal moment in the restructuring of the international financial governance

system, developing an open model with Chinese characteristics is not only crucial for safeguarding national economic security but also serves as a strategic leverage for establishing a new pattern of international cooperation.

## 1.2 Correlation Analysis

Current research exhibits multidimensional characteristics at the methodological level. International scholars predominantly employ cross-national panel data models, exemplified by the IMF's study on the correlation between the financial openness index and economic growth. This study encompasses capital flow data from 120 economies spanning from 1980 to 2020, including FDI inflows, FDI outflows, foreign exchange reserves, gold, Special Drawing Rights, and other assets. The VAR model has substantiated the positive effect of institutional openness on financial stability. However, the sample selection is biased towards developed countries, which limits its explanatory power concerning the specificities of emerging markets [4]. Domestic literature primarily utilizes the case comparison method, contrasting regulatory innovations between the Shanghai Free Trade Zone and the Dubai International Financial Center. The data sources predominantly rely on cross-border capital flow monitoring reports from the State Administration of Foreign Exchange, which provide the advantage of timely policy tracking. Nevertheless, there is a relative scarcity of empirical research at the micro-level of financial institutions [5].

In the realm of theoretical construction, the Impossible Trinity, also known as the "Impossible Triangle," is a significant theory in international economics, proposed by economists Robert Mundell and Marcus Fleming in the 1960s. The Impossible Trinity provides a foundational framework for the opening of capital accounts; however, new practices such as the cross-border payment of the digital yuan and the interconnectivity of green bond markets have transcended the boundaries of traditional theory [6]. With the establishment of the digital yuan's cross-border payment system and the global interconnectivity of green bond markets, this classical theoretical framework is now facing new challenges. In recent years, the academic community has engaged in in-depth discussions on the innovation of open models under the "Dual Circulation" strategy, among which the "Dual-Track Open Model" proposed by the Tsinghua University research team is particularly representative. This model differentiates the opening processes of traditional finance and digital finance, providing a new research perspective for risk management. However, existing research remains predominantly theoretical, with relatively few empirical studies conducted in pilot regions such as the Guangdong-Hong Kong-Macao Greater Bay Area [7]. Meanwhile, since 2018, the research focus has shifted to the systematic design of institutional openness, as corroborated by policy practices such as the expansion of the "Bond Connect" and the launch of the Cross-boundary Wealth Management Connect. Notably, reform studies on the Qualified Foreign Institutional Investor system have provided an important basis for improving foreign financial institutions' access policies. It is noteworthy that in cutting-edge areas such as cross-border flows of digital currencies and carbon financial derivatives trading, most research remains at the conceptual level, and an operational risk assessment system has yet to be established.

The research gaps are primarily concentrated in three key dimensions. Firstly, studies on the operational efficiency of regional financial cooperation mechanisms are relatively underdeveloped, particularly due to the lag in updating relevant data within the ASEAN Currency Swap Network. Secondly, the applicability of traditional risk assessment models in the context of digital financial openness is inadequate, with a notable lack of quantitative research addressing regulatory coordination for cross-border data flows. Thirdly, research on green financial openness tends to excessively reference EU standards, often neglecting the practical needs associated with industrial transformation in developing countries. These research deficiencies present innovative entry points, particularly offering valuable insights for the construction of a financial openness evaluation index system that aligns with dual carbon goals.

## 2 Theoretical Framework

Exploring the relationship between financial openness and competitive advantage necessitates an integration of interdisciplinary research perspectives. From the standpoint of international finance, the comparative advantage strategy provides theoretical support for this inquiry [8], emphasizing that countries should concentrate on developing relatively efficient financial sectors to achieve optimal resource allocation through cross-border collaboration. For instance, China's advantage in mobile payment technology illustrates this point: by promoting digital financial cooperation with Southeast Asia, not only has the export of technical standards been realized, but new market territories have also been developed. The path dependence theory in institutional economics clarifies that financial openness must align with local institutional characteristics, a phenomenon evident in China's capital account liberalization process, where pilot projects for cross-border capital pool operations in free trade zones were initially implemented and subsequently expanded nationwide. The mechanism for establishing competitive advantages can be interpreted through the 'dual circulation' theoretical framework. In the internal circulation dimension, financial market reforms have significantly enhanced resource allocation efficiency by dismantling monopolistic structures and improving the multi-tiered capital market system. In 2023, the number of newly listed companies on the Science and Technology Innovation Board of the Shanghai Stock Exchange surged by 40% year-on-year, demonstrating the vital role of institutional innovation in aggregating innovative capital. The external circulation dimension emphasizes institutional openness, which markedly enhances the international competitiveness of market entities by establishing rule systems aligned with international standards and implementing regulatory guidelines for globally systemically important banks. The synergistic effect of the two major circulations is prominently demonstrated in the development of the Guangdong-Hong Kong-Macao Greater Bay Area. The 'Cross-boundary Wealth Management Connect' mechanism not only addresses the diverse asset allocation needs of residents but also enhances the service capabilities of financial institutions [9-10].

The Dynamic Equilibrium Theory emphasizes the importance of risk management and prevention in open processes [11]. Drawing from the principles of stress testing in

physics, China has developed an effective risk resistance mechanism in its bond market opening by implementing position limits for foreign investors and establishing a comprehensive monitoring system for cross-border capital flows. This flexible opening strategy significantly mitigated the risk of capital outflow during the Federal Reserve's interest rate hikes in 2022, ensuring that the total scale of RMB bonds held by foreign institutions remained stable at over 3.5 trillion yuan. In emerging sectors such as digital finance, it is essential to establish an adaptive regulatory framework that balances the promotion of cross-border data flows with the protection of financial security. Currently, theoretical development is encountering new challenges. The traditional "Impossible Trinity" has demonstrated its limitations in the digital currency era, as the cross-border flow of encrypted assets like Bitcoin has exceeded the regulatory scope of sovereign currencies. The openness of green finance necessitates a re-examination of theoretical assumptions, and new policy instruments such as the Carbon Border Adjustment Mechanism are reshaping the trajectory of international capital flows. These developments are pushing the theoretical framework towards greater dynamism and contextualization, necessitating the construction of an extended model that incorporates environmental factors and digital technology parameters to better guide financial openness practices in alignment with the "Dual Carbon" goals.

### **3 Current Research Status on Financial Opening Policies at Home and Abroad**

#### **3.1 Research on Innovative Pathways for Financial Opening Policies**

In the exploration of innovative pathways for financial opening-up policies, scholars both domestically and internationally have amassed a wealth of research findings focusing on system design, pilot experiences, and risk prevention and control [12]. Scholars such as Liu Fei have emphasized that financial opening-up necessitates a coordinated approach to both internal and external cycles, gradually advancing institutional innovation through 'pressure testing zones' like the Free Trade Pilot Zones. The cross-border capital pool management mechanism, first trialed in the Shanghai Free Trade Zone, has enhanced the efficiency of cross-border corporate financing by 40% through a 'categorized management + quota control' model, while simultaneously reducing the risk of abnormal capital flows to one-third of the level prior to the pilot. This 'gradual opening-up' pathway effectively validates the five-dimensional integration theory proposed by Dong Zhiyong's team, which advocates for coordinated reforms across dimensions such as exchange rate marketization and capital account liberalization.

The innovation of cross-border capital flow management tools has emerged as a focal point of research. The 'Cross-boundary Wealth Management Connect' mechanism implemented in the Guangdong-Hong Kong-Macao Greater Bay Area, which establishes an annual total quota of 300 billion yuan and an individual investment limit of 1 million yuan, not only addresses the asset allocation needs of residents but also creates a risk buffer zone. Data indicate that the cumulative transaction volume of this mechanism exceeded 80 billion yuan within its first two years of operation, with no incidents

of cross-border arbitrage reported. Scholars such as Cheng Gui emphasize that this type of 'pipeline-style' opening innovation fundamentally represents institutional openness, achieving 'orderly openness' through rule alignment [13]. However, research conducted by scholars like Zhang Jianwei cautions that developing countries must be wary of the risks associated with 'regulatory arbitrage' when drawing from such experiences, as the exchange rate volatility resulting from abnormal cross-border capital flows in emerging markets in 2022 was 2.3 times higher than in 2019 [14]. The opening and innovation of digital finance introduce new characteristics. The 'regulatory sandbox' mechanism piloted in Qianhai, Shenzhen, enables foreign fintech companies to test blockchain-based cross-border payment products in limited scenarios, facilitating the alignment of 17 technical standards. Through the 'technologically neutral' regulatory model, the scale of cross-border use of digital RMB in the pilot areas has achieved an annual growth rate of 150%. However, subsequent studies have revealed that 78% of current financial opening policies still focus on traditional sectors, while the supply of supporting systems for digital financial opening significantly lags behind. This is particularly evident in areas such as cross-border data flow certification and the legal validity of smart contracts, where institutional gaps persist [15]. In terms of green finance, notable breakthroughs have been made in exploring opening pathways. The establishment of the China-Europe Green Bond Standards Mutual Recognition Mechanism has reduced the overseas issuance costs of China's green bonds by 0.8 percentage points, with the relevant issuance scale exceeding 500 billion yuan in 2023. Research conducted in the border free trade zones has uncovered the existence of 'double standards' in the certification of green financial products, where some projects have experienced a 45% extension in financing cycles due to discrepancies in environmental benefit assessments between domestic and international standards [16]. This not only supports the viewpoint that institutional openness necessitates strengthened standard alignment but also highlights the complexity of policy innovation in emerging fields [17].

### **3.2 Exploration of Two-Way Opening Mechanism in Financial Markets**

In the construction of a two-way opening mechanism in the financial markets, domestic and foreign scholars have conducted in-depth discussions on market connectivity and institutional access reforms. The capital market connectivity mechanism has become a crucial lever for enhancing international competitiveness. Innovative arrangements such as "Shanghai-Hong Kong Stock Connect" and "Shenzhen-Hong Kong Stock Connect" have increased the market value of A-shares held by foreign investors from 350 billion yuan in 2014 to 3.2 trillion yuan in 2023, with an average annual growth rate of 28%. This type of "pipeline-style opening" has facilitated capital flows through technical system connections and quota control, while also building a risk isolation wall. However, research has found that there is still room for arbitrage due to time differences in cross-border transaction settlements. In 2022, the abnormal trading volume of the Shanghai-Shenzhen-Hong Kong Stock Connect increased fivefold compared to the initial period of the mechanism's launch, highlighting the need for refined rule alignment [18]. Following the removal of foreign ownership limits for banks and securities

companies in 2018, the asset size of foreign-funded legal person banks grew by 65% within three years, yet their market share remains below 3%. The reform of the financial institution access system exhibits a dual characteristic, with the gap between "access openness" and "substantive participation" stemming from challenges in localization adaptation. Currently, the access rate of foreign institutions to China's digital payment systems is only 40% of that of domestic institutions. In this regard, it is recommended to adopt the "twin peaks" regulatory model, which involves easing market access while strengthening conduct regulation. After Shenzhen Qianhai incorporated the timeliness of foreign institutions' complaint responses into the access evaluation indicators during its pilot program, customer satisfaction increased by 25 percentage points [19].

In the context of the two-way opening of financial markets, the innovation of risk prevention and control mechanisms has emerged as a significant area of research. Bank stress test models indicate that the volatility of cross-border capital flows for foreign banks is 30% higher than that of Chinese institutions, highlighting the need for differentiated liquidity monitoring indicators. The 'Cross-border Financial Sandbox' mechanism, currently being piloted in the Guangdong-Hong Kong-Macao Greater Bay Area, permits 20 pilot institutions to test innovative products with a quota of 30 billion yuan. This initiative not only fosters a cross-border fintech ecosystem but also maintains risk exposure within 0.5% of regional financial assets. At present, 78% of opening policies are concentrated on traditional businesses, leaving a regulatory vacuum for emerging scenarios such as cross-border flows of digital assets, which urgently necessitates the establishment of a dynamically adjusted negative list management system [20]. The issue of standard alignment in two-way openness is becoming increasingly prominent. The pilot project on the interconnection of the China-EU green bond market has revealed that, due to differences in environmental information disclosure standards, the average certification period for Chinese enterprises issuing bonds overseas is 45 days longer than that for domestic issuances. This confirms the view that institutional openness necessitates enhanced rule integration. The 'equivalent certification' mechanism implemented in the Shanghai Free Trade Zone, which mutually recognizes 62 international standards, has increased the efficiency of cross-border green financing by 30%. However, practical experience indicates that standard alignment cannot be merely replicated; it is essential to establish transitional arrangements that are tailored to the industrial characteristics of developing countries. For instance, the 10-year buffer period adopted by ASEAN countries when implementing Basel III provides valuable insights for China.

### **3.3 Research on the Empowerment of Open Processes by FinTech**

The role of financial technology in promoting financial openness is becoming increasingly prominent, as technologies such as blockchain and digital currencies reshape the landscape of cross-border financial services. The blockchain-based cross-border payment platform piloted in Qianhai, Shenzhen, has reduced the time required for cross-border remittances from the traditional 2-3 days to less than 10 minutes through the implementation of distributed ledger technology, while transaction costs have decreased by over 60%. This technological breakthrough not only enhances payment

efficiency but also allows regulatory authorities to track fund flows in real-time through the automatic execution of foreign exchange compliance reviews via smart contracts. Furthermore, the cross-border testing of the central bank digital currency in the Guangdong-Hong Kong-Macao Greater Bay Area indicates that the usage share of the digital yuan in cross-border trade settlements has risen from 0.3% in 2021 to 5.7% in 2023, highlighting the potential of digital currency to overcome the limitations of the traditional SWIFT system.

In the field of regulatory coordination, the application of regulatory technology has effectively addressed the challenges of risk control during the opening-up process. The 'regulatory sandbox' mechanism established by the Shanghai Free Trade Zone enables both Chinese and foreign financial institutions to test cross-border financial products within a controlled environment, having validated 23 innovative solutions to date. Notably, the blockchain trade financing platform has reduced the financing approval cycle for small and medium-sized enterprises by 70%. This technology-driven regulatory model not only sustains market vitality but also reduces the risk identification and response time to within 30 minutes through data-penetrative supervision.

In the context of the deep integration of financial openness and technological empowerment, financial openness has exhibited new characteristics influenced by technological advancements. The cross-border mutual recognition of digital identity authentication systems has significantly reduced the time required for residents in Guangdong, Hong Kong, and Macao to open bank accounts online, decreasing it from five working days to just fifteen minutes, while the account activation rate has increased to 92%. Furthermore, the establishment of a cross-border credit information data-sharing platform has enhanced the success rate of cross-border financing for small and medium-sized enterprises in the Greater Bay Area by 40%, with the non-performing loan rate maintained below 1.2%. Research indicates that currently, 78% of financial openness policies still concentrate on traditional sectors, while the supply of supporting systems for digital financial openness lags significantly, particularly in critical areas such as the legal validity of smart contracts and the pricing of cross-border data assets, which reveal institutional gaps [21]. Additionally, the deep integration of financial technology and the opening-up process has led to other challenges. The seven money laundering risk incidents that arose during the 2023 cross-border payment pilot of the digital RMB have highlighted the complexities associated with the anonymous payment function, particularly in concealing the source of funds through multi-level transfers and intricate transaction networks. Technical vulnerabilities were exploited due to inadequate transaction records and identity verification processes. As a relatively new payment tool, the digital RMB has, due to the lag in regulatory systems, inadvertently created opportunities for money laundering activities. Consequently, it is crucial to promote the synchronous development of technological and institutional innovations and to establish a more comprehensive regulatory framework to effectively mitigate financial risks and ensure the healthy progression of the digital RMB.

### **3.4 Prevention and Control of Systemic Financial Risks in an Open Environment**

In the context of financial openness, the management of systemic financial risks has consistently held a pivotal position. Cross-border capital flows exhibit a pronounced pro-cyclical nature, with global economic fluctuations often triggering substantial short-term capital movements across borders. From an international practice perspective, developed countries have effectively mitigated the risks associated with financial openness by constructing a multi-layered defense system. The primary line of defense involves the adoption of dynamic macroprudential measures, which include establishing foreign currency liquidity ratio indicators to limit the scale of banks' short-term foreign debt to less than 30% of total liabilities. Additionally, a stress assessment system is established to regularly conduct cross-border risk stress tests on systemically important banks. Finally, by leveraging the cross-border regulatory cooperation mechanism, a unified bank resolution framework is constructed, enhancing the coordination efficiency among member states in managing crises involving multinational financial institutions by 40%. These institutional arrangements provide valuable references for optimizing China's financial risk prevention and control system. Current research faces demands for breakthroughs in multiple areas. Firstly, the cross-border flow of digital currencies poses challenges to traditional regulatory models, necessitating the urgent establishment of technical specifications for through-type regulation [22]. Secondly, the lack of standardized methods for measuring environmental risks in the context of green finance openness results in inefficiencies in cross-border project certification [23]. Thirdly, the construction of regional financial safety networks is progressing slowly, with the utilization rate of currency swap agreements between ASEAN and China, Japan, and South Korea being less than 5%. This reflects inherent deficiencies in the mechanism design [24]. Future research should focus on advancing the innovation of intelligent regulatory technologies, establishing an electronic monitoring system for cross-border data flows, closely monitoring regional network hot topics and search trends, effectively preventing the spread of risk perception, enhancing dynamic risk monitoring capabilities, and safeguarding national financial security and stability. Additionally, efforts should be made to strengthen the collaborative mechanism for transnational crisis management, thereby providing a solid security foundation for the deepening of financial openness.

### **3.5 Comparative Analysis of International Financial Center Development Experiences**

Countries exhibit significant variations in their approaches to establishing international financial centers. London, recognized as a global hub for foreign exchange trading, commands a 40% market share, attributed to its flexible legal framework and the agglomeration effect of professional service institutions. This organic development model is underpinned by a mature common law system and a pool of international talent; however, it also presents structural risks stemming from an over-reliance on the financial services sector [25]. The robustness of New York's financial market is primarily derived

from the international status of the US dollar and the advanced development of its capital market. In 2023, technology companies constituted 65% of initial public offerings (IPOs) on Nasdaq. While this "capital + innovation" synergy model offers valuable insights, it encounters challenges due to a fragmented regulatory framework, as evidenced by the 2008 financial crisis, which illuminated this institutional vulnerability. In the realm of institutional innovation, emerging financial centers have introduced novel development paradigms. For instance, Singapore has successfully attracted over 500 fintech companies by implementing a "regulatory sandbox" and a differentiated licensing system [26], resulting in a tripling of its asset management scale over the past decade to reach \$4.6 trillion. This government-led, targeted policy approach has demonstrated significant efficacy in areas such as tax incentives and legal coherence; however, an excessive dependence on these policy advantages may undermine market resilience. Meanwhile, the Dubai International Financial Centre has improved the efficiency of cross-border dispute resolution by 50% through the establishment of an independent judicial system, the creation of specialized financial courts, and the adoption of English common law. This innovative approach to financial law has effectively bridged the gap between the Islamic financial system and contemporary financial regulations.

In the exploration of financial opening-up, China's practices have demonstrated a unique path of innovation. The Shanghai Free Trade Zone has piloted cross-border capital pool management through the "classified accounts+electronic fence" technology, achieving a balance between efficient capital flow and controllable risks, resulting in a 1.2 percentage point reduction in corporate cross-border financing costs. As an offshore RMB hub, Hong Kong has seen the average daily trading volume of Bond Connect increase from RMB 30 billion in 2017 to RMB 260 billion in 2023, leveraging the "Connectivity" mechanism. However, comparative studies reveal that domestic financial centers still lag in key indicators such as the depth of the derivatives market and the proportion of internationalized talent. Only 18% of financial practitioners in Shanghai possess cross-border experience, significantly lower than London's 45%. Meanwhile, international experience has provided China with three crucial insights. Firstly, institutional innovation must precisely align with market demands, as exemplified by the City of London's regular updates to the "Financial Services Act" to ensure that regulations remain current. Secondly, risk prevention and control should establish a multi-tiered buffer mechanism; the New York Stock Exchange's circuit breaker mechanism and daily monitoring system form a comprehensive protective network. Thirdly, talent cultivation should emphasize practical capabilities; the Global FinTech Institute established by the Monetary Authority of Singapore, through an industry-education integration model, annually produces 3,000 versatile talents. These experiences provide significant references for constructing financial centers with Chinese characteristics, offering practical guidance, especially in the layout of digital financial infrastructure and the export of green financial standards.

## 4 Research Gaps and Future Research Directions

### 4.1 The Disconnection Between Theoretical Construction and Practice

In the practice of financial opening-up, there exists a significant gap between theoretical models and real-world demands as highlighted in existing research. The conflict between the anonymity feature of the digital yuan in cross-border payments and anti-money laundering requirements has exposed the inadequacies of traditional regulatory theories in adapting to technological changes. This situation often places policymakers in a dilemma: adhering to existing theoretical frameworks may result in missed development opportunities, while breaking through these theoretical constraints lacks a scientific basis. The contradiction between policy tool innovation and insufficient theoretical support is evident across multiple fields. For instance, the cross-boundary wealth management connect mechanism piloted in the Guangdong-Hong Kong-Macao Greater Bay Area, while effectively balancing openness and security through quota control, relies more on practical experience than on systematic theoretical guidance in its design. Data indicates that the cumulative transaction volume of this mechanism reached 80 billion yuan within its first two years of operation. However, related theoretical research remains confined to traditional capital flow models, failing to construct a new analytical framework that aligns with the concept of 'pipeline-style opening.' Similar issues are particularly pronounced in the field of green finance, where discrepancies in green bond standards between China and Europe have resulted in certification delays for 30% of cross-border projects, underscoring the insufficient guiding role of environmental finance theory in the development of mutual recognition mechanisms for standards. Furthermore, the theoretical gaps in the practice of regional financial cooperation urgently need to be addressed. The utilization rate of the ASEAN Plus Three Currency Swap Agreement has remained below 5% for an extended period, highlighting the limitations of traditional international financial theories in designing regional cooperation mechanisms. Existing research predominantly focuses on national-level opening strategies, which lack the theoretical explanatory power to address issues such as the reconstruction of cross-border payment systems and the establishment of sub-regional financial safety nets. In the realm of financial openness, although the border trade financial model has achieved significant success in cross-border settlement innovations along the China-Laos railway within the Yunnan Pilot Free Trade Zone, the absence of systematic theoretical refinement renders its successful experiences challenging to replicate across different regions. This disconnection between theory and practice has resulted in the ineffective transformation of policy innovation achievements into a promotable knowledge system, underscoring the urgent need for constructing a more adaptive and forward-looking theoretical framework.

### 4.2 Analysis of Research Methodology Limitations

In the complex environment of financial openness, existing research methodologies reveal multiple limitations. The construction of dynamic simulation models tends to be idealized, with traditional DSGE models often presupposing that market participants

are entirely rational. However, real-world data indicates that the decision-making bias rate of individual investors in the cross-border payment of digital RMB in the Guangdong-Hong Kong-Macao Greater Bay Area reaches 35%, leading to a deviation of over 20% between model predictions and actual fluctuations. This assumption of a perfect market struggles to capture real-world factors such as herd behavior, resulting in a false negative rate of up to 40% in early warning models during the 2018 emerging market currency crisis. Meanwhile, the application of stress testing methods suffers from limitations due to scenario simplification. Current research predominantly focuses on traditional financial risks, employing parameters from the 2008 financial crisis to test banks' resilience to shocks. However, the emerging risks spurred by the openness of digital finance have not been sufficiently incorporated. In the 2023 cross-border pilot of the digital yuan, 78% of money laundering risks were attributed to vulnerabilities in smart contracts, a specific type of technical risk that lacks adequate assessment dimensions within the current stress testing framework. Moreover, the testing cycle is rigidly defined, with exogenous shocks, such as the Federal Reserve's interest rate hikes, often simplified as one-time events. In reality, the spillover effects of such policies are both persistent and cumulative. Additionally, data collection and analysis technologies face practical limitations; the SWIFT data, which is essential for cross-border financial research, is updated with a lag of approximately 45 days, complicating the real-time capture of fund flows from digital payment platforms. Although blockchain technology has the potential to enhance data transparency, a survey conducted in the Guangdong-Hong Kong-Macao Greater Bay Area indicates that 73% of cross-border fintech companies refuse to share complete on-chain data due to concerns over business confidentiality, resulting in systematic bias within empirical research samples. The deployment of machine learning algorithms for risk prediction also presents interpretability challenges. A state-owned bank developed a cross-border credit risk assessment model with an accuracy rate of 85%; however, its application is limited because the underlying logic of the algorithm is difficult for regulatory agencies to comprehend. These limitations hinder existing research methods from effectively enhancing the real-world applicability of theoretical models in navigating the complexities of financial openness.

#### **4.3 Recommendations for Interdisciplinary Research Pathways in Financial Opening**

In the evolving landscape of financial openness research, it is essential to dismantle disciplinary barriers and construct a multidimensional analytical framework. Incorporating a geopolitical perspective can elucidate the power dynamics involved in the restructuring of international financial regulations. Furthermore, research on digital governance must integrate technological ethics and legal regulations, as the "trilemma" of cross-border data flow—namely, the free flow of data, national security protection, and personal privacy protection—is challenging to achieve simultaneously. This necessitates the establishment of a hierarchical and classified management system. Additionally, the intersectional study of environmental finance and industrial economics is urgently needed, particularly in assessing the impact of the Carbon Border Adjustment Mechanism (CBAM) on cross-border capital flows. This assessment requires the

integration of life cycle analysis methods from environmental science with risk pricing models from finance, thereby providing a foundation for the design of hedging tools through interdisciplinary calculations. To this end, a three-dimensional linkage research mechanism is established. First, a joint laboratory for finance and computer science is created, focusing on quantum secure encryption technology for cross-border payment systems. Second, a geopolitico-economic research platform is developed to track and analyze the transmission paths of financial sanctions imposed by major economies. Third, an open database is constructed to integrate multidimensional data, including cross-border capital flows, digital financial transactions, and environmental benefits. Methodologically, a 'digital twin' simulation system can be developed to incorporate geopolitical variables, technical parameters, and financial indicators into a unified analytical framework, enabling dynamic scenario simulations of complex situations. Lastly, the construction of a social impact assessment system necessitates the integration of sociological methods. Research on the impact of inclusive financial openness on border regions should combine field surveys with big data analysis, establishing an evaluation model that incorporates ethnic factors and educational levels.

## 5 Conclusion

Through systematic analysis, it has been determined that successful financial opening necessitates the development of a 'dynamic adaptation' capability, which is manifested in the flexible integration of policy tools. For instance, the 'stress test' mechanism implemented in the Free Trade Pilot Zone accumulates experience through small-scale trials and gradually disseminates effective practices. This 'gradual innovation' approach effectively mitigates risks while preserving openness and vitality. Concurrently, the current theoretical framework must transcend traditional analytical paradigms and establish a new model that encompasses three dimensions: institutional flexibility, technological empowerment, and risk buffering. Institutional flexibility underscores the adaptability of regulatory systems, as demonstrated by the Shanghai Free Trade Zone's conversion of 62 international standards into localized regulations. Technological empowerment highlights the supportive role of digital infrastructure, with blockchain technology enhancing cross-border payment efficiency by sixfold. Risk buffering necessitates the establishment of a multi-tiered early warning mechanism, exemplified by the Guangdong-Hong Kong-Macao Greater Bay Area, which compresses risk identification time to within 30 minutes through a real-time monitoring system. A three-dimensional model can more effectively elucidate innovative practices such as pipeline-style openness, thereby providing a scientific foundation for policy formulation.

At the practical level, emphasis should be placed on cultivating four core competencies: Institutional innovation capability is reflected in the flexibility of rule alignment, exemplified by the 'equivalent certification' mechanism adopted in the mutual recognition of China-EU green bonds. Risk prevention and control capability necessitates the support of intelligent regulatory tools; for instance, the application of 'on-chain traceability' technology in the cross-border pilot of digital RMB has effectively curbed money laundering risks. Market cultivation capability requires robust infrastructure to lead the

way, as evidenced by the eightfold increase in the daily trading volume of Bond Connect over five years, which demonstrates the effectiveness of the connectivity mechanism. International cooperation capability relies on standard export; the 'Common Ground Taxonomy' for sustainable finance, in which China participated in formulating, has been adopted by 30 countries, illustrating the enhancement of rule-making discourse power. Future research should adopt a practice-oriented approach, focusing on three integrations: the integration of top-level design with grassroots innovation, such as transforming the experiences of free trade zones into nationwide policies; the integration of traditional fields with emerging tracks, by simultaneously advancing the opening of capital accounts and establishing a framework for digital financial regulations; and the integration of independent exploration with international collaboration, through the construction of a financial cooperation network under the 'Belt and Road' initiative to promote mutual recognition of standards. This includes the establishment of a dynamic evaluation system for open effectiveness, which incorporates micro-indicators such as corporate sense of gain and market vitality into the evaluation dimensions, thereby forming a more comprehensive policy feedback mechanism.

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