Volatility Spillover Effects of Singapore's Stock Market on Major Global Stock Markets

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Abstract. Against the background of Singapore evolving into a capital hub connecting the globe and ASEAN, this paper explores the risk spillover effects and dynamic evolution of Singapore's stock market with major global stock markets, and clarifies the driving role of domestic financial policy shocks. Based on the daily return data of representative stock market indices of 12 countries from 2016 to 2026, the Generalized Spillover Index Model proposed by Diebold & Yilmaz (2012) is adopted to conduct static and dynamic spillover network analysis, and the regional heterogeneity of spillover effects and the mechanism of policy-driven spillover are further examined. The results show that Singapore's stock market has a net spillover value of 4.81 in the global market system, acting as a net spillover provider with obvious geographical heterogeneity. Dynamically, the spillover effect of Singapore's stock market surges in global risk events and moderates in stable periods, with its net spillover remaining positive for most of the time and only turning negative briefly during the COVID-19 pandemic, and recovering to a stable positive level after 2023 under the background of strengthened financial supervision. This paper concludes that Singapore has developed into a net spillover-type capital hub driving regional capital flows, and puts forward policy suggestions such as strengthening regional collaborative supervision, optimizing risk buffer mechanisms, balancing financial openness and stability, and improving spillover structure by policy guidance, so as to consolidate its regional financial center position and enhance the risk resistance capacity of its stock market.

Keywords: Singapore’s stock market; Volatility Spillover Effect; Capital Hub; Diebold & Yilmaz Model.

1 Introduction

In recent years, with the accelerated transformation of the global capital flow pattern, Singapore has evolved from a regional financial center in Southeast Asia into a "capital hub" connecting the global and ASEAN markets. In terms of capital scale, Singapore's Assets Under Management (AUM) increased from SGD 3.03 trillion in 2019 to SGD 6.07 trillion in 2024 [1], with cross-border capital accounting for more than 78% of the

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total and investment targets covering over 100 countries worldwide, solidifying its position as the largest cross-border capital distribution center in the Asia-Pacific region [2].

Functionally, Singapore serves as a core "transshipment springboard" for foreign capital to enter the ASEAN market. A substantial volume of foreign capital flows into Vietnam, Thailand and Indonesia through Singaporean holding companies, forming a cascading effect. Against this backdrop, Singapore's stock market has become the "price signal hub" for regional capital allocation. In 2024, the Singapore Straits Times Index (STI) recorded an annual increase of 17.59%, ranking among the top major stock indices in Southeast Asia. Empirical studies have shown that the shock happened in the Singapore stock exchange will be immediately transmitted to the Indonesian stock exchange [3].

Institutional innovation has further consolidated Singapore's hub status. In 2020, the Monetary Authority of Singapore (MAS) and the Accounting and Corporate Regulatory Authority (ACRA) jointly launched the Variable Capital Company (VCC) framework, and granted tax incentives to eligible funds through the Singapore Resident Fund Scheme (Section 13R) [1]. By the beginning of 2024, the number of active VCCs had increased substantially by approximately 9.8 times compared with the initial launch stage [4]. The flexibility of the VCC allows it to be used across different fund strategies, investor classes and asset classes [5].

Owing to its unique position, the linkage effect of Singapore's stock market with other global markets has become a key issue for understanding regional financial integration and cross-border risk transmission. Therefore, this paper takes the Singapore market as the core to examine the risk spillover effects and their dynamic evolution between Singapore and major stock markets in the surrounding regions and the whole world.

2 Literature Review

Existing studies on the linkage of Singapore's stock market mostly position it as a passive recipient of global shocks. With the consolidation of Singapore's status as a global capital hub, its role is undergoing fundamental changes.

Lu & Zhang (2022) [6] argued that Singapore has the ability to alter the direction of global capital flows by attracting the return of part of capital, talents and technology enterprises to Asia, yet they failed to consider the subsequent impacts such as risk spillover and linkage effects on regional and global stock markets brought by capital inflows into Singapore as a global capital hub. Engle et al. (2012) [7] held that Hong Kong, China is the core market for net volatility spillovers, while other Asian markets including Singapore exhibit varying degrees of volatility absorption characteristics (i.e., the received volatility is higher than the transmitted volatility). By the end of 2024, Singapore's AUM had reached SGD 6 trillion [2], and its huge capital volume is sufficient to independently shape the dynamics of regional markets. However, previous studies mostly regarded the "capital hub" as a static institutional arrangement, ignoring its essence as a dynamic capital agglomeration process.

Recent studies have begun to focus on the intermediary depth of Singapore. Kesumah & Azhar (2025) [8] illustrated that Singapore, as a regional financial hub, has a significant positive spillover effect on the five ASEAN countries. The World Bank (2023a) [9] ASEAN Economic Monitor pointed out that as the primary financial hub of ASEAN, Singapore's share of cross-border capital inflows and outflows within the region has been on a continuous rise. Data from the World Bank (2023b) [10] showed that Singapore's FDI accounted for more than one-third of the total ASEAN FDI in 2023, a share that increased significantly compared with 2018. Meanwhile, Koh & Lee (2021) [5] analyzed that the VCC structure is characterized by flexible capital structure, the ability to adopt an umbrella sub-fund structure and applicability to all types of fund strategies, which provides great operational flexibility for fund managers and investors and in fact shortens the allocation cycle of cross-border capital. These evidences indicate that Singapore has become a core node connecting the global and ASEAN markets.

One of the limitations of current research is the failure to combine institutional innovations such as the VCC with the specific spillover dynamics of the stock market. Although Koh & Lee (2021) [5] demonstrated the institutional advantages of the VCC, the quantitative evaluation of its impact on the short-term linkage intensity of the stock market remains to be supplemented.

In terms of regional heterogeneity, existing studies lack a systematic comparison between ASEAN and developed markets. Thomas et al. (2017) [11] once pointed out that emerging and frontier markets can have an impact on developed markets, but their sample is relatively early and they did not specifically explore the transmission effect of Singapore's market on other major stock markets, failing to reflect the current situation after the doubling of AUM. Yahya et al. (2023) [12] used the Diebold & Yilmaz model to confirm the increasing interconnectivity among ASEAN markets and pointed out that Singapore occupies a key position in the regional network, yet it is necessary to further decompose its asymmetric impacts on different global economies. In addition, Akhtaruzzaman et al. (2021) [13] found that Singapore had a significant asymmetry in downward risk spillovers to the global market during the COVID-19 pandemic.

Finally, the impact of Singapore's domestic policies on global spillovers also deserves attention. In February 2025, the Monetary Authority of Singapore (MAS) launched the Equity Market Development Programme (EQDP) with a total scale of SGD 5 billion, aiming to enhance the liquidity of the local stock market through incentive measures [14]. Whether such targeted policies will change the allocation ratio of funds between the domestic and overseas markets and thus reshape the path of risk spillovers remains a research gap at present.

Therefore, this paper intends to systematically examine the characteristics of Singapore's stock market as a "capital hub" from three dimensions: market heterogeneity, time heterogeneity and policy shocks, by adopting dynamic analysis methods.

3 Methodology and Data

3.1 Methodology

To objectively and accurately analyze the impact of the volatility of Singapore's stock market on other major global stock markets, this paper adopts the Generalized Spillover Index Model based on generalized variance decomposition proposed by Diebold & Yilmaz (2012) [15]. By using this model, we construct a total spillover index to measure the overall intensity of volatility spillovers among markets, and further decompose the directional spillover indices, thus realizing the identification of the transmission direction and net contribution of Singapore's volatility risks among different financial markets.

3.2 Data

This paper selects the most representative stock market indices of 12 countries including Singapore, China, the United States, Japan, South Korea, India, Australia, Russia, Germany, France, the United Kingdom and Spain: the Straits Times Index (SG), the Shanghai Composite Index (CN), the NASDAQ 100 Index (US), the Nikkei 225 Index (JP), the KOSPI50 Index (KR), the S&P CNX NIFTY Index (IN), the S&P/ASX200 (AU), the DAX30 (DE), the French CAC40 (FR), the FTSE 100 (GB), and the Spanish IBEX35 (ES). Daily return data of all indices are used, with the data interval from January 1, 2016 to January 1, 2026. All data are sourced from investing.com.

The descriptive statistics of the data are shown in Table 1. The mean of Singapore's index return is 0.02% with a standard deviation of 0.01, indicating that the data is highly concentrated with minimal volatility. The mean and median of the indices of other countries are also close to 0.06%, while Russia's index has the largest range of maximum and minimum values with a kurtosis of 130.90, showing obvious extreme values, which is mainly affected by the Russia-Ukraine conflict.

Table 1. Descriptive Statistics

	SG	CN	US	JP	KR	IN	AU	RU	DE	FR	GB	ES
Mean	0.02%	0.00%	0.07%	0.03%	0.03%	0.04%	0.01%	0.03%	0.04%	0.04%	0.02%	0.04%
Median	0.03%	0.01%	0.12%	0.06%	0.05%	0.04%	0.07%	0.07%	0.09%	0.08%	0.05%	0.08%
Maximum	0.09	0.08	0.12	0.10	0.09	0.09	0.07	0.20	0.11	0.08	0.09	0.08
Minimum	-0.07	-0.08	-0.12	-0.12	-0.09	-0.13	-0.10	-0.33	-0.12	-0.12	-0.11	-0.14
Std.Deviation	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
Skewness	-0.15	-0.28	-0.07	-0.40	-0.20	-1.36	-1.10	-4.25	-0.71	-1.20	-0.78	-1.82
Kurtosis	22.00	11.36	13.15	13.55	8.99	27.16	18.81	130.90	18.46	18.15	21.34	25.84

4 Analysis of Empirical Results

4.1 Static Spillover Network Analysis

Setting the lag order of the VAR model to 4 and the forecast horizon h to 10, the results of spillover effects for the full sample are shown in Table 2. Singapore's total outward volatility spillover to other markets is 64.79, while the total volatility spillover received from other countries is 59.98, with a net spillover value of 4.81, indicating that its external impact is greater than the impact of external shocks on itself. From a regional perspective, Singapore's spillover effects exhibit strong geographical heterogeneity: the spillover intensity to Asian and Oceanian countries is high, such as Japan (8.09) and South Korea (9.55), with the exception of Russia (3.06); the impact on European countries such as Spain (4.04) and the United Kingdom (5.01) is moderate; and the impact on North American countries represented by the United States (3.51) is the smallest. The total spillover effects received by Singapore from other countries also follow this pattern, with its influence mainly concentrated in Asia and Oceania and a smaller impact on more distant regions, which is highly consistent with its positioning as a regional financial center.

Table 2. Static Spillover Network

	SG	CN	US	JP	KR	IN	AU	RU	DE	FR	GB	ES	from
SG	40.02	4.03	0.75	7.74	9.11	8.35	8.49	1.12	4.74	5.07	5.91	4.68	59.98
CN	6.26	61.82	1.83	5.38	6.25	2.84	4.12	0.88	2.96	2.53	3.24	1.88	38.18
US	3.51	2.36	47.99	6.38	5.07	3.55	6.01	0.62	7.58	7.11	5.09	4.72	52.01
JP	8.09	3.22	1.10	39.15	12.24	4.85	10.44	0.90	5.36	5.47	4.60	4.61	60.85
KR	9.55	3.89	1.28	12.29	38.74	7.26	9.09	0.90	4.67	4.56	4.30	3.45	61.26
IN	8.52	1.96	1.73	4.97	7.40	39.79	6.33	2.08	6.72	7.15	7.34	6.01	60.21
AU	8.24	2.45	2.01	9.73	8.61	6.56	37.54	1.13	5.54	6.01	7.31	4.86	62.46
RU	3.06	1.06	0.45	1.99	1.73	3.07	2.52	64.35	4.89	6.17	6.66	4.05	35.65
DE	4.36	1.49	3.62	4.51	3.63	3.87	5.21	1.76	23.49	19.11	13.84	15.11	76.51
FR	4.15	1.29	3.35	4.31	3.39	3.97	5.01	2.10	18.63	23.06	14.96	15.78	76.94
GB	5.01	1.46	2.33	3.59	3.27	4.44	5.82	2.61	15.07	16.69	25.88	13.83	74.12
ES	4.04	1.03	2.75	4.11	2.78	3.82	4.37	1.60	16.83	17.98	14.07	26.63	73.37
to	64.79	24.24	21.21	65.00	63.47	52.57	67.41	15.68	93.00	97.85	87.32	78.97	
net	-4.81	13.94	30.80	-4.15	-2.21	7.64	-4.96	19.97	-16.49	-20.91	-13.20	-5.61	

4.2 Dynamic Spillover Network Analysis

The rolling window method is adopted, with a window size of 200 samples and a step size of 1, to obtain the dynamic characteristics of spillover effects over time. As shown in Figure 1, it is the total spillover index of the sample markets. The trade frictions in

2018 led to a sharp decline in the index, weakening the risk contagion between Singapore and the stock markets of major countries. In early 2020, affected by the COVID-19 pandemic, the systemic risks of the global financial market surged, driving the index up to 78%, followed by a rapid decline. After 2023, with the gradual stabilization of the global market and the strengthening of Singapore's financial supervision, the total spillover index fluctuated between 55% and 62%, rising significantly during global risk events and moderating in periods of market stability.

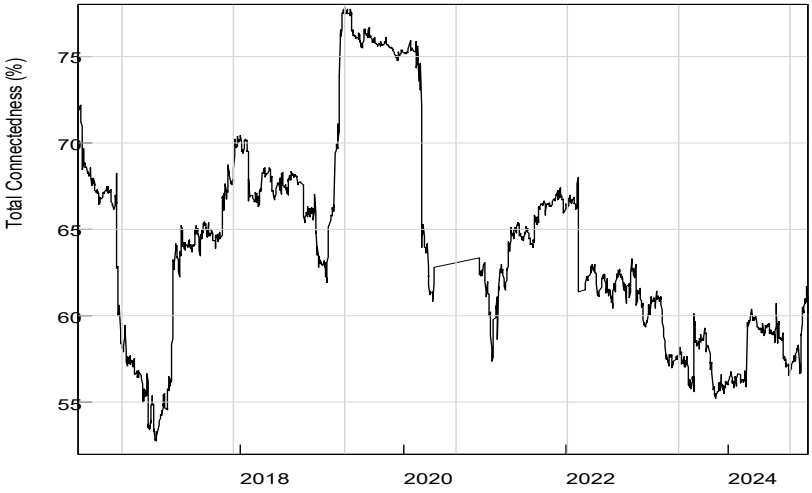

Fig. 1. Dynamic Changes in the Total Spillover Index

Figure 2 shows the dynamic changes of the FROM, TO and NET indices of Singapore's stock market. Both the outward spillover (TO all others) and the inward spillover (FROM all others) exhibit significant time-varying characteristics, rising synchronously during risk events such as the COVID-19 pandemic in 2020 and peaking at one point; the net spillover (NET) is positive for most of the time, turning negative only briefly during the pandemic.

Figure 3 shows that the net spillover effects of Singapore's stock market on major global stock markets present significant regional heterogeneity: the net spillover effect on the Chinese market fluctuates slightly around zero on the whole; the net spillover effects on Asian markets such as Japan, South Korea and India are mainly positive, with only brief negative impulses appearing at key nodes such as the COVID-19 pandemic in 2020 and the high global inflation in 2022; the net spillover effects on European and American markets such as the United States, Germany, France, the United Kingdom and Spain are negative in most periods, indicating that Singapore's market plays a more important role as a risk recipient in these relationships; the net spillover effect on the Australian market is negative on the whole with gentle fluctuations, while the net spillover effect on the Russian market is the most volatile, showing obvious peaks during the COVID-19 pandemic in 2020 and the geopolitical conflict in 2022, reflecting a strong risk transmission characteristic.

Fig. 2. Dynamic Changes in Major Indices of Singapore

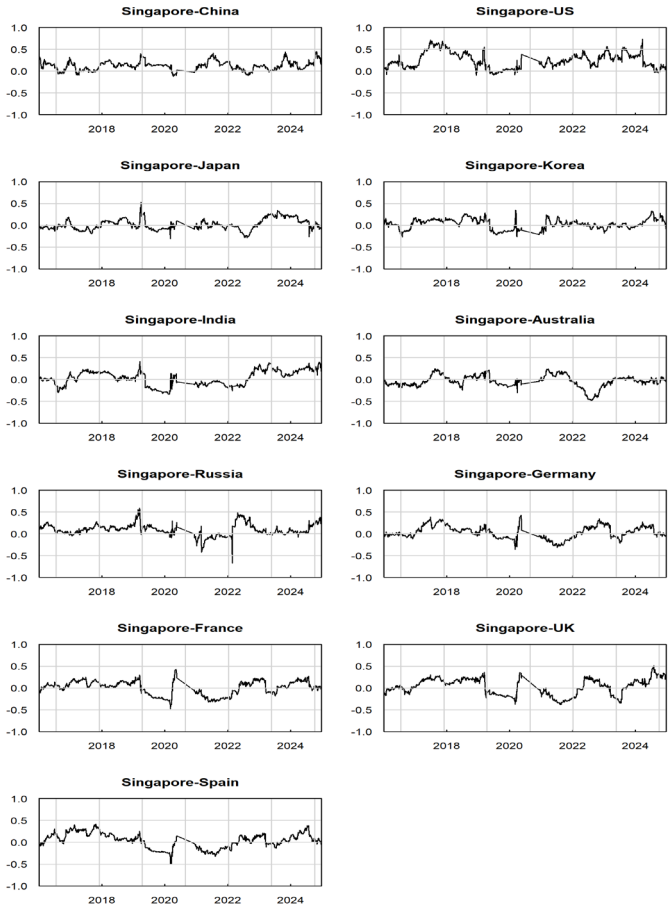

Fig. 3. Dynamic Net Spillover Effects from Singapore's Stock Market to Major Global Stock Markets

4.3 Driving Effect of Policy Shocks on Singapore's Cross-Border Net Spillovers

The net spillover characteristics of Singapore's stock market (a net spillover value of 4.81) are not simply driven by the expansion of capital scale. Its domestic financial policy adjustments and institutional innovations have become the core endogenous driving forces for strengthening outward volatility spillovers by changing the liquidity of the local market and accelerating cross-border capital transmission, and the impacts of policy shocks are highly consistent with the empirical data and chart characteristics of static and dynamic spillovers.

The implementation of the VCC framework and tax incentive policies [1,4] has greatly improved the allocation efficiency of Singapore as a regional capital hub, driving the diversion of cross-border capital to the ASEAN and Asian markets with Singapore as the core, and directly amplifying its spillover intensity to Asian markets. This policy effect is highly consistent with the static spillover data in Table 2: Singapore's spillover values to Asian countries such as Japan (8.09), South Korea (9.55) and India (8.52) are significantly higher than those to European and American markets, becoming the core contribution source of its net spillovers, which confirms that institutional innovation has strengthened Singapore's volatility spillover capacity to surrounding markets through the capital transmission path.

The launch of the EQDP in 2025 [14], with the core of boosting the liquidity of the local stock market, has further consolidated the status of Singapore's Straits Times Index as a regional price signal hub. Combined with the low volatility characteristic of the local market brought by the strengthened financial supervision of MAS after 2023 (the standard deviation of SG is 0.01 in the descriptive statistics with minimal volatility), Singapore has become a regional capital safe-haven node in the stage of global market stabilization. This policy impact is intuitively reflected in the dynamic spillover characteristics in Figure 2: after 2023, the net spillover (NET) index of Singapore has remained positive, without the negative fluctuations seen during the pandemic, and the outward spillover (TO) has always maintained a stable high level, indicating that the stable local market driven by policies has become an important support for its continuous net spillover effects.

At the same time, the improvement of cross-border capital allocation efficiency driven by policies has also made the volatility transmission of Singapore's stock market more timely, a feature that is prominently reflected in the dynamic spillover of regional heterogeneity in Figure 3: its net spillovers to Asian markets are mainly positive all the time, with only brief fluctuations during systemic risk events such as the pandemic and global inflation. The capital agglomeration effect brought by policies has made the stability of such regional spillovers much higher than that of European and American markets, forming a transmission chain of "policy optimization - capital agglomeration - stable spillovers", and also making the regional characteristics of Singapore's net spillovers highly consistent with policy orientation.

On the whole, the implementation of Singapore's policies such as the VCC and the EQDP [1,4,14] has directly strengthened its outward volatility spillover capacity

through three paths: improving capital allocation efficiency, boosting local market liquidity and stabilizing the market through supervision, which has become a key factor for it to establish its position as a regional net spillover provider. Moreover, the effects of policy shocks are all empirically confirmed in the static spillover data, dynamic spillover trends and regional heterogeneity characteristics.

5 Conclusion

Based on the data of Singapore's Straits Times Index and the stock indices of 11 other major countries and regions worldwide from 2016 to 2026, this paper adopts the Generalized Spillover Index Model proposed by Diebold & Yilmaz (2012) [15] to explore the volatility spillover effects of Singapore's stock market on major global stock markets. The static results show that Singapore's stock market has a total outward spillover effect of 64.79 and a total inward spillover effect of 59.98, with a net spillover value of 4.81, indicating that its external impact is greater than the impact of external market shocks on itself. Meanwhile, it exhibits strong geographical heterogeneity, with the strongest impact on Asia and Oceania, followed by Europe, and the weakest on North America. This characteristic is highly consistent with Singapore's positioning as the core capital hub of ASEAN. The dynamic results reveal that the total spillover index of Singapore's stock market rises sharply during major global risk events and falls back in periods of market stability; both outward and inward spillovers increase synchronously during major global risk events, while the net spillover is positive for most of the time, turning negative only briefly during the COVID-19 pandemic in 2020. After 2023, with the strengthening of Singapore's financial regulatory policies, the local market has maintained a low volatility characteristic, and the net spillover effect has returned to a stable positive value, further consolidating its market position as a net spillover provider. At the same time, the impact of Singapore's stock market volatility also shows significant geographical heterogeneity: the net spillover effect on the Chinese market fluctuates slightly around zero; the net spillover effects on other Asian markets such as Japan, South Korea and India are mainly positive, with only brief negative impulses at key nodes such as the pandemic and global inflation; the net spillover effects on European, American and Australian markets are mostly negative; affected by the Russia-Ukraine conflict, the net spillover effect on the Russian market is the most volatile, reflecting the differentiated transmission characteristics of geopolitical events and market environments on cross-border spillovers.

Notably, the formation and consolidation of the net spillover characteristics of Singapore's stock market are closely related to a series of domestic financial institutional innovations and policy adjustments in Singapore. The launch of the VCC framework in 2020 [1,4] has greatly improved the efficiency of cross-border capital allocation, driving the diversion of global capital to the ASEAN region with Singapore as the hub, and directly strengthening its spillover intensity to Asian markets; the implementation of the EQDP in 2025 [14] has boosted the liquidity of the local stock market through incentive measures, further consolidating its status as a regional price signal hub and providing a market foundation for the continuation of cross-border net spillover effects;

the continuous strengthening of financial supervision after 2023 has kept the local stock market in a stable state with low volatility, which has become an important support for it to maintain net spillovers in the stage of global market stabilization. It can be seen that Singapore's domestic financial policies have become the core endogenous driving force for shaping its cross-border net spillover pattern through the paths of capital agglomeration, liquidity boosting and volatility transmission, and also have promoted its evolution from a traditional regional financial center to a net spillover-type capital hub driving regional capital flows.

Based on the above research, in order to enhance the risk resistance capacity of Singapore's stock market and consolidate and strengthen its positioning as a regional financial center, the following suggestions are put forward: First, strengthen regional collaborative supervision. Singapore has a natural geographical advantage with East Asian countries such as China, Japan, South Korea and India, which builds a natural bridge for the formation of trade exchanges and capital flow channels among stock markets. Faced with major global risk events, Singapore should make full use of its own geographical and capital hub advantages to establish an economic circulation circle for cross-border capital flow and stock market risk joint prevention with surrounding countries, implement collaborative supervision, and jointly resist cross-border risk shocks. Second, optimize the risk buffer mechanism. Singapore can expand the scale of foreign exchange reserves, improve the financial derivatives system, and establish special supervision and early warning measures for cross-border capital flows for high-sensitive markets such as Russia with geopolitical conflicts or other emergencies, so as to be well prepared for possible risk shocks. Third, balance openness and stability. While maintaining Singapore's role as a regional financial hub, it is necessary to further refine foreign capital management, guide the inflow of long-term capital relying on policies such as the VCC and the EQDP [1,4,14], improve anti-money laundering and information disclosure systems, avoid the transmission of external risks to the local market through cross-border capital, and consolidate its function as a "regional risk buffer" rather than an "amplifier". Fourth, optimize the spillover structure relying on policies. Combined with the regional heterogeneity characteristics of cross-border spillovers, continuously improve the incentive policies for the local financial market, strengthen capital links and benign spillovers to the Asian region, and weaken the negative transmission effects brought by short-term cross-border capital fluctuations, so as to promote the net spillover effect to develop in a more stable and sustainable direction.

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