

# Impact of Multidimensional Distance on Financial Cooperation: A Case Study of China and Neighboring Countries

## Wpływ wielowymiarowej odległości na współpracę finansową: studium przypadku Chin i krajów sąsiednich

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### Abstract

Financial cooperation is an important way to promote regional cooperation for high-quality development. In the process of deepening financial cooperation, cooperation faces many external influences due to the political, economic and cultural differences of different countries. To achieve the United Nations Sustainable Development Goals, such as poverty eradication and ensuring sustainable consumption and production models, we propose a novel way to takes the multidimensional distance of countries and financial cooperation as the research objects to explore the influence mechanism of differences on financial cooperation between China and neighboring countries. Taking China and Southwest neighboring countries as the research object, the financial cooperation events are assigned quadratic values. Quantitative analysis of the level of financial cooperation among countries by using the vertical and horizontal sliding scale method to measure the financial cooperation index among countries. The political, economic, financial, and cultural dimensions of distance between countries are taken as important factors affecting financial cooperation, and the effects of each dimension of distance on financial cooperation are examined separately and tested for robustness and heterogeneity. The results of the study found that multidimensional distance plays a driving role in China's financial cooperation with its southwestern neighboring countries, with cultural distance having the most significant impact on the level of financial cooperation. In addition, the results of the heterogeneity test conclude that the effect of multidimensional distance on financial cooperation in the presence of temporal and spatial heterogeneity. These findings are applicable to Policymakers who need to design financial cooperation strategies tailored to the specific temporal and spatial contexts, adapting them to the unique characteristics of the region.

**Key words:** financial cooperation, multidimensional distance, vertical and horizontal gearing method, China and neighboring countries

### Streszczenie

Współpraca finansowa jest ważnym sposobem promowania współpracy regionalnej na rzecz rozwoju wysokiej jakości. W procesie pogłębiania współpracy finansowej, współpraca napotyka wiele wpływów zewnętrznych ze względu na różnice polityczne, ekonomiczne i kulturowe różnych krajów. Aby osiągnąć Cele Zrównoważonego Rozwoju Organizacji Narodów Zjednoczonych, takie jak wyeliminowanie ubóstwa i zapewnienie zrównoważonych modeli konsumpcji i produkcji, proponujemy nowy sposób, aby przyjąć wielowymiarową odległość krajów i współpracę finansową jako obiekty badawcze w celu zbadania mechanizmu wpływu różnic na współpracę finansową między Chinami a krajami sąsiadującymi. Biorąc Chiny i kraje sąsiadujące z Południowym Zachodem jako obiekt badawczy, elementom współpracy finansowej przypisano wartości kwadratowe. Ilościowa analiza poziomu

współpracy finansowej między krajami przy użyciu metody pionowej i poziomej skali przesuwnej w celu zmierzenia wskaźnika współpracy finansowej między krajami. Polityczne, ekonomiczne, finansowe i kulturowe wymiary odległości między krajami są traktowane jako ważne czynniki wpływające na współpracę finansową, a skutki każdego wymiaru odległości na współpracę finansową są badane oddzielnie i testowane pod kątem solidności i heterogeniczności. Wyniki badania wykazały, że wielowymiarowa odległość odgrywa rolę napędową we współpracy finansowej Chin z ich południowo-zachodnimi sąsiadami, przy czym dystans kulturowy ma największy wpływ na poziom współpracy finansowej. Ponadto wyniki testu heterogeniczności wskazują, że wpływ wielowymiarowej odległości na współpracę finansową wobec heterogeniczności czasowej i przestrzennej. Wyniki te mają zastosowanie dla decydentów politycznych, którzy muszą projektować strategię współpracy finansowej dostosowanej do konkretnych kontekstów czasowych i przestrzennych, uwzględniając unikalne cechy regionu.

**Słowa kluczowe:** współpraca finansowa, wielowymiarowa odległość, pionowa i pozioma metoda dźwigni finansowej, Chiny i kraje sąsiadujące

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## 1. Introduction

In the context of irreversible regional economic integration, economic interaction is the driving force of global interaction, and financial cooperation is the catalyst for the stable financial and economic development of countries. The China-ASEAN relationship is the most successful and dynamic model of regional cooperation in the Asia-Pacific region, and the bilateral financial sector has continued to deepen exchanges, providing strong support to the high-quality development of the Belt and Road. Under the policy of opening the financial gateway to ASEAN, Yunnan, and Guangxi have become important pilot projects for financial reform along the border, and have established a financial cooperation mechanism for ASEAN, with Vietnam, Laos, Myanmar, Cambodia, Thailand, and other southwest neighboring countries of China as the main cooperation countries. By the end of 2023, among the five neighboring countries, China has implemented bilateral local currency swap cooperation agreements with Thailand and Laos and signed local currency settlement agreements with Cambodia and Laos, and Chinese-funded commercial banks have achieved full coverage (Sun and Hou, 2019). As the scope of cooperation with its southwest neighbors continues to expand, with a gradual diversification of the scope of cooperation, China's financial cooperation with its external neighbors is also becoming more complex. The multidimensional distance formed by the diversity of systems and different levels of economic and financial development affects the level of financial cooperation.

Thus, the differences in economic strength, political cultures, border trade facilitation, and other factors between countries lead to both explicit and implicit disparities in the politics, economy, finance, and culture of financial cooperation between China and its neighboring countries. In order to address these challenges, this study poses the following research questions.

- (1) Do these differences increase operating costs and complicate cooperation, thereby resulting in a lower level of financial cooperation?
- (2) Can the complementary effects of integrating advantageous resources enhance the level of financial cooperation?
- (3) How does multidimensional distance impact financial cooperation between China and its southwestern neighbors?
- (4) How can the effects of such heterogeneity be minimized, or how can the advantages arising from these differences be effectively utilized?

With the increasing globalization and transnational issues, it is difficult for a single country to independently address complex challenges of sustainable development. Inter-country financial cooperation not only supports nations in achieving United Nations goals such as eliminating poverty and ensuring sustainable consumption and production patterns through funding and resources, but also promotes global sustainable development by facilitating transnational cooperation, technology transfer, and knowledge sharing. It acts as a catalyst for achieving sustainable financial and economic development in various countries. As the core means of cross-border allocation of economic resources, financial cooperation not only provides strong financial support for sustainable development but also enhances the capacity of countries to address complex development challenges through technology transfer, resource sharing, and the construction of transnational collaboration mechanisms, laying the foundation for achieving sustainable development goals. On one hand, financial cooperation deepens transnational capital flows, promoting efficient allocation and utilization of resources, providing ample funding for the implementation of sustainable development projects, and alleviating the shortage of funds in developing countries and regions. On the other hand, financial cooperation plays a key role in promoting green finance, sustainable investment, and climate finance, helping the global economy transition to a sustainable model. Moreover, financial cooperation supports the reduction of development gaps and the improvement of global economic governance efficiency, providing support for building a more equitable, transparent, and inclusive international financial system, thereby further promoting inclusive growth in the global economy and society.

At present, there is a wealth of qualitative analysis on international financial cooperation, but quantitative research is still lacking and there are deficiencies in the construction of indicators that fail to measure the dimension of financial cooperation more comprehensively. In addition, existing studies have focused on the impact of distance on cross-border investment, foreign trade, and other external economic cooperation, and rarely on the impact of distance on financial cooperation between countries. In selecting indicators of multidimensional distance, most of the existing studies are analyzed from political, economic, and cultural perspectives, while this paper considers that the level of financial development is one of the conditions for financial cooperation, and therefore financial distance is included in the examination factors. Based on this, this paper will construct the index system of financial cooperation between China and the southwest neighboring countries and measure the cooperation index to further explore the influence of political, economic, financial, and cultural distance on financial cooperation, with the aim of further deepening the financial cooperation between China and the southwest neighboring countries.

The remainder of this paper is organised as follows. Section 2 is a brief review of the related literature, and Section 3 is the Financial cooperation index construction. Section 4 is the empirical test. Section 5 performs the main findings and policy implications.

## 2. Literature review

### 2.1. Transaction cost theory

Transaction cost theory is one of the core theories of institutional economics, originally proposed by Nobel Prize-winning economist Coase (1937) in his classic paper *The Nature of the Firm*. He pointed out that transaction costs were the costs of utilizing the price mechanism and were the fees that had to be paid in order to carry out a market transaction, and that these costs included, inter alia, information-seeking costs, bargaining costs, decision-making costs, and default costs. Subsequently, to address the issue of transaction cost metrics, Williamson added to the theory (Williamson O. E., 1975). In order to study the way organizational structures are governed, he portrayed transaction costs in terms of asset specialization, transaction frequency and uncertainty, and concluded that asset specialization is a key determinant of the choice between market and hierarchical governance. There are two basic assumptions in transaction cost theory, which are the assumption of limited rationality and the assumption of opportunism. The assumption of limited rationality emphasizes that decision makers have limited cognitive abilities, information barriers, and time pressures, and that the decision-making process cannot be fully rational to gather all possible outcomes, and that agreements need to be reached to prevent unforeseen circumstances from occurring, thus incurring transaction costs. The opportunistic assumption refers to the collaborative process in which participants take advantage of information asymmetry and earmarked investments, as well as other favorable conditions (Williamson, 2010), to act at the expense of others in order to maximize their own interests.

### 2.2. Growth pole theory

The growth pole theory was first proposed by the French economist François Perroux on the basis of abstract economic space. According to Perroux (1955), from the spatial perspective of economic development, growth does not occur in all regions at the same time, but rather, depending on its intensity, Sunley and Martin (2001) occurs first in certain growth points or poles and then spreads out in different ways, with varying impacts on the economy as a whole. Subsequent scholars Gurmar Myrdal, Boudeville, Hirschman and others have further added to and expanded the content and domain of growth pole theory. Growth pole is not a simple spatial concept, it is a kind of strong growth capacity and innovation capacity shown in the economic form, it can produce a kind of multiplier amplification effect through the linkage with the external economy and industry, radiating the development of other industries in the region, so as to promote the development of the economic network in the region (Wang and Qiao, 2012). As a guiding theory of modern regional development, the growth pole theory has become an important theoretical basis for the formulation of regional development planning in countries all over the world, and in particular has played a theoretical role in guiding the promotion of balanced regional development. Therefore, the growth pole theory is applied to the study of financial cooperation to explore the impact of multidimensional distance on financial cooperation as a way to enhance the level of financial cooperation between China and neighboring countries.

### 2.3. Financial cooperation and the United Nations' Sustainable Development Goals

There is a close connection between the United Nations Sustainable Development Goals (SDGs) and transnational finance. The United Nations Sustainable Development Goals, adopted by the United Nations General Assembly in 2015, aim to achieve a prosperous and inclusive future. O'Connor D E. (2016) highlighted the importance of the global economy, and transnational financial cooperation is an indispensable part of it. Previously, Shehu A Y (2005) mentioned initiatives against international corruption and money laundering, as corruption and money laundering can hinder sustainable development and contradict the United Nations Sustainable Development Goals. He emphasized that such transnational cooperation between the United Nations and the European Union is crucial for achieving these goals. Alam S. (2007) discussed the relationship between sustainable development and free trade,

and transnational financial cooperation can promote free trade, thereby advancing sustainable development. Later, Sakurai M. Y. (2015) suggested that more countries need to increase their contributions to international public financing, and emerging South-South cooperation institutions such as the BRICS Development Bank and the Asian Infrastructure Investment Bank have provided new opportunities for investment in sustainable development. In summary, transnational financial cooperation is of significant importance to the United Nations' Sustainable Development Goals, requiring enhanced cooperation among nations to collectively promote the process of global sustainable development.

#### 2.4. Studies on financial cooperation

The academic community has not yet reached a consensus on the construction of the financial cooperation indicator system. Previously, when discussing the characteristics of financial cooperation across the Taiwan Strait, the current development status of financial cooperation was quantitatively assessed by using the three aspects of cooperation in banking, securities, and insurance as indicator variables in combination with the three traditional segments of the financial industry (Zheng et al., 2017). With the in-depth promotion of the Belt and Road construction, scholars have shifted their focus to financial cooperation with neighboring countries. Adopting local currency exchange rate volatility (Gillet et al., 2020) and cross-border bank capital flows (Huang et al., 2022) as proxies for regional financial cooperation as a way to characterize financial cooperation. To further expand the connotation of financial cooperation, scholars have conducted in-depth analyses of the current situation and characteristics of financial cooperation among countries along the route in terms of monetary cooperation, investment and financing cooperation, financial services cooperation, credit cooperation, and financial regulatory cooperation, and formed a regional financial cooperation system mainly based on monetary cooperation, financial institution cooperation, financial market cooperation and financial regulatory cooperation (Tang and Huang, 2022).

Existing domestic and international research results classify financial cooperation measurement methods into direct and indirect measurement methods. The direct measurement method is to measure the level of regional financial cooperation through the weight of indicators, which mainly includes the principal component analysis method, the entropy value method and the vertical and horizontal pulling grade method (Du J and Hua, 2022; Yu, 2019; Jorg, 2013). The indirect measurement method has formed a methodological system based on the comprehensive indicator method of financial integration (Arti and You, 2016), Zhao et al (2015) uses the individual indicator method of financial integration, and the model of consumption risk-sharing. However, in the measurement process of the indirect measurement method, it is necessary to first conduct a correlation test to clarify the causal relationship with financial cooperation, and finally, the accuracy of the measurement results should be considered due to the possible bias of the results in the measurement process (Habib and Zurawicki, 2002).

#### 2.5. Study on the impact of multidimensional distance on financial cooperation

Regarding the impact of distance on the international economic sphere, there are two major conclusions in domestic and international studies, which are the regime proximity and regime escape theories. Habib and Zurawicki (2002) point out that international political and economic systems have a significant impact on cooperation between countries. Under conditions of institutional convergence, cooperation among countries is easier to achieve because they have fewer social, cultural and political differences, which helps to reduce misunderstandings and conflicts and promotes mutual understanding and trust, thus guaranteeing stable and long-lasting cooperation (Witt and Lewin, 2007). Conversely, cooperation between countries is more difficult when there are large differences in international political and economic systems.

Contrary to the institutional proximity theory, the institutional flight theory suggests that the greater the differences in bilateral institutional environments, the greater the scale of financial cooperation. In OFDI research, Buckley and Casson (2009) point out that developing countries with relatively backward institutional environments tend to resort to OFDI to reduce the constraints imposed by backward institutions in the home country on firms' development, and define this phenomenon as *institutional flight*. In the perspective of institutional flight theory, multinational financial institutions will actively utilize these institutional differences to achieve their business objectives (Kolstad and Wiig, 2009).

Specifically, some scholars believe that the increase in political differences increases the *liability of foreignness* of multinational enterprises (MNEs), which increases their cognitive and adaptive costs in the host country environment, leading to higher incremental costs and thus reducing their performance (Yu et al., 2023; Buckley et al., 2007). However, another group of scholars argues that differences in the political environment can compensate for the lack of resource elements in the country itself, and the comparative advantage resulting from these differences can lead to arbitrage incentives for MNEs (Kitano and Takaku, 2022; Elsayed et al., 2024). In the political environment of a superior country, MNEs can make full use of the *Springboard Theory*, weakening the political distance caused by the *liability of foreignness* effect (Wang et al., 2022).

In international trade and cross-border mergers and acquisitions, economic distance is an important factor to consider. Increased economic distance leads to higher trade and transportation costs, which may increase instability and trade risks in the trade process (Qing and Benjie, 2023), thus hindering international trade activities. On the

contrary, some scholars believe that increased economic distance has a facilitating effect on foreign economic activities. In the case of large economic differences, to seek complementary advantages, spontaneous foreign economic activities are often generated to enhance the competitiveness of enterprises while obtaining technological spillovers, promoting the sharing of resources and technology, improving overall economic efficiency, and promoting bilateral cooperation and innovation (Cheng and Yu, 2024).

Financial distance, or financial development distance, is the result of differences in the level of financial development between countries. Relevant studies have pointed out that the level of financial development has a huge impact on the level of OFDI, and it has also been found that the impact of financial distance should not be ignored. On the one hand, due to the origin of multinational enterprises in the home country, their ability to raise funds is affected by the financial environment of the home country, if they invest in a market with a different financial environment from that of the home country, it will produce a certain degree of maladjustment (Shehzad et al., 2021; Ting and Yongkun, 2023), which will lead to increased difficulties in investment and financing, and even investment failure. On the other hand, for multinational enterprises, the differences in the financial environment may affect the flow of funds, and this problem needs to be solved through the establishment of cooperative relationships to obtain stable sources of funds and a wider range of business support so that the financial distance increases so that countries seek to cooperate to achieve mutual benefit and win-win.

In institutional economics, cultural distance is defined as informal institutions, which are differences in language, values, and norms of behavior. Some scholars believe that cultural distance hurts cooperation. The increase in cultural distance will produce *cultural ambiguity*, which often leads to communication barriers and misunderstandings, brings distrust to both sides, expands integration costs and risks, and further affects investment efficiency (Cameron and Quinn, 1999). Some scholars believe that cultural distance has a positive impact on cooperation. Cultural distance will bring different thinking modes, technical capabilities, and management concepts to achieve cultural complementarity, and cultural complementarity will bring new ideas for cooperation and better achieve synergy effect (Liu and Ding, 2020).

While a substantial body of qualitative research exists on international financial cooperation, the field remains notably deficient in quantitative studies, particularly those involving comprehensive and robust indicator systems. Current indicators often fail to capture the multifaceted dimensions of financial cooperation, limiting the accuracy of these analyses. Moreover, most existing studies have concentrated on the effects of distance on cross-border investment, foreign trade, and other forms of external economic collaboration, leaving a significant gap in exploring how distance influences financial cooperation specifically between nations. This gap presents an opportunity for more nuanced and data-driven investigations into the role of multidimensional distance in shaping financial cooperation frameworks.

### 3. Financial cooperation index construction

To make the results of the financial cooperation index more accurate and reasonable, this paper uses a direct measurement method. Combined with existing literature (Tang et al., 2023; Guo, 2002), this paper selects financial infrastructure cooperation, financial institution cooperation, financial market cooperation, monetary cooperation, financial risk prevention, and regulatory cooperation as indicators to measure financial cooperation index more comprehensively, and adopts event valuation method to measure the level of financial cooperation. The determination of weight is very important to the calculation of the index, which directly affects the scientific and reliability of evaluation results. The degree of financial cooperation is a dynamic process, and its level index needs to be measured by a dynamic comprehensive evaluation method. Therefore, building on existing methodologies (Lee et al., 2022; Ding et al., 2024), adopts the vertical and horizontal separation grade method and adds the time dimension into the evaluation process. This method is a comprehensive evaluation method that can reflect the characteristics of dynamic three-dimensional time series. It can not only show the differences between evaluation objects in a certain time section, but also show the distribution of evaluation objects in the longitudinal dimension of time, reduce the calculation amount, make the measurement results more comprehensive and scientific, and make up for the result errors caused by static evaluation methods to a certain extent.

#### 3.1. Event assignment method

The financial cooperation between China and neighboring countries studied in this paper refers to the cooperation between the participating parties in the areas of financial infrastructure, financial institutions, financial markets, currency and financial regulation. However, English journals are less researched in this area, mostly concentrated in Chinese journals, so the focus is on references to Chinese experts' research in this area. In terms of the selection of secondary indicators, most of the previous studies used dichotomous variables such as whether or not to sign a currency swap agreement and whether or not to sign a Memorandum of Understanding (MOU) as proxies. Proxy variables are assigned values of 0 or 1, which to some extent reflect the state of financial cooperation, but do not capture the progressive process of financial cooperation. In addition, relying only on individual proxy variables to assess the progress of financial cooperation between countries may not accurately reflect the true level of financial

cooperation due to an incomplete selection of indicators. In order to enrich the connotation of financial cooperation, reflect the sample data, and effectively avoid the bias generated by the 0-1 assignment method, this paper adopts the event assignment method (Cha and Pei, 2016) to construct the panel data of financial cooperation index. Drawing on existing literature event assignment method (Lei and Lin, 2022; Gani and Clemes, 2013), and taking into account the actual situation of financial cooperation between China and the five neighboring countries, four scores of 0.5, 1, 1.5 and 2 are adopted to assign values to the categories of cooperation in various fields. The specific assignment criteria are shown in Table 1. The same criteria are used for all cooperation events in each country, which increases the horizontal comparability among countries and reduces the subjectivity of the assignment to a certain extent. The final scores are obtained for China's cooperation with the countries in the five areas of financial infrastructure, financial institutions, financial markets, currency, and financial regulation.

Table 1. Criteria for assigning values to financial cooperation indicators, source: Authors' own elaboration

Financial infrastructure cooperation	<ul style="list-style-type: none"> <li>① Establishment of cooperation platforms for cross-border finance, information exchange, online systems, etc. assigned a value of 0.5;</li> <li>② Opening of bank card payment and settlement, opening of RMB settlement accounts, and opening of cross-border RMB transfer channels are assigned a value of 1;</li> <li>③ RMB Agent Clearing Agreement with RMB clearing bank assigned a value of 1.5;</li> <li>④ The establishment of payment clearing and settlement systems, the development of accounting cooperation standards and legal cooperation systems are assigned a value of 2.</li> </ul>
Cooperation with financial institutions	<ul style="list-style-type: none"> <li>① Mutual financial institutions, representative offices and cooperation offices are assigned a value of 0.5</li> <li>② Local commercial banks, insurance companies and securities companies are assigned a value of 1 for business transactions; multilateral financial institutions are assigned a value of 1 for cooperation;</li> <li>③ State-owned banks, policy banks, business transactions between stock exchanges are assigned a value of 1.5; business cooperation between central bank branches is assigned a value of 1.5;</li> <li>④ Operational cooperation and exchange between national central banks is assigned a value of 2.</li> </ul>
Financial market	<ul style="list-style-type: none"> <li>① Exchanges and meetings on financial market cooperation are assigned a value of 0.5; the signing of a memorandum on financial market cooperation is assigned a value of 0.5;</li> <li>② Money lending, credit, investment and financing operations assigned a value of 1;</li> <li>③ The MLF, bond, and equity cooperation is assigned a value of 1.5;</li> <li>④ Bilateral funds, bonds, and stocks co-operate in assigning a value of 2.</li> </ul>
Monetary cooperation	<ul style="list-style-type: none"> <li>① Holding exchangescor, conference, etc. related to monetary cooperation is assigned a value of 0.5; signing bilateral border trade settlement agreements, trade settlement agreements is assigned a value of 0.5; signing multilateral monetary cooperation agreements is assigned a value of 0.5;</li> <li>② Handling bilateral cross-border RMB business, carrying out bilateral RMB settlement, deposits and loans, etc. assigned a value of 1;</li> <li>③ Signing of bilateral monetary cooperation, local currency swap agreements assigned a value of 1.5;</li> <li>④ Inclusion of the renminbi in the national reserve currency is assigned a value of 2.</li> </ul>
Financial regulatory cooperation	<ul style="list-style-type: none"> <li>① Financial regulatory cooperation Exchanges and colloquiums are assigned a value of 0.5;</li> <li>② Anti-Money Laundering, Anti-Counterfeit Currency, Anti-Terrorist Financing is assigned a value of 1;</li> <li>③ Inter-financial institution regulatory cooperation, bilateral signing of regulatory cooperation memorandums assigned a value of 1.5;</li> <li>④ Bilateral construction of regulatory cooperation mechanisms assigned a value of 2.</li> </ul>

### 3.2. Vertical and horizontal slotting method

The first step is to construct a panel data table. Assuming that there are  $n$  evaluated objects  $S_1, S_2, \dots, S_n$  with  $m$  evaluation indicators  $x_1, x_2, \dots, x_m$  and in chronological order, the raw data  $\{x_{ij}(t_k)\}, \{x_{ij}(t_k)\}$  are obtained to form a three-dimensional time series (see table 2).

Table 2. Temporal stereoscopic data, source: Authors' own elaboration

	$t_1$	$t_2$	...	$t_T$
	$x_1, x_2, \dots, x_m$	$x_1, x_2, \dots, x_m$	...	$x_1, x_2, \dots, x_m$
$S_1$	$x_{11}(t_1) \dots x_{1m}(t_1)$	$x_{11}(t_2) \dots x_{1m}(t_2)$		$x_{11}(t_T) \dots x_{1m}(t_T)$
$S_2$	$x_{21}(t_1) \dots x_{2m}(t_1)$	$x_{21}(t_2) \dots x_{2m}(t_2)$		$x_{21}(t_T) \dots x_{2m}(t_T)$
$S_n$	...	...	...	...
	$x_{n1}(t_1) \dots x_{nm}(t_1)$	$x_{n1}(t_2) \dots x_{nm}(t_2)$		$x_{n1}(t_T) \dots x_{nm}(t_T)$

The second step is to determine the index weight. The basic principle is as follows:

Take the comprehensive evaluation function as:

$$Y_i(t_k) = \sum w_j x_{ij}(t_k) \quad (1)$$

Where  $k = 1, 2, \dots, T$ ;  $i = 1, 2, \dots, n$   $w_j$  ( $j = 1, 2, \dots, m$ ) is the weight coefficient.

$Y_i(t_k)$  Total sum of squared deviations:

$$\sigma^2 = \sum_{k=1}^T \sum_{i=1}^n (Y_i(t_k) - \bar{Y})^2 \quad (2)$$

After normalizing the raw data, the total sum of squared deviations can therefore also be expressed as:

$$\sigma^2 = \sum_{k=1}^T [w^T H_k w] = w^T \sum_{k=1}^T H_k w \quad (3)$$

where  $w = (w_1, w_2, \dots, w_m)^T$ ,  $H = \sum H_k$  is a symmetric matrix of order  $m \times m$  and  $H_k = X_k^T X_k$  ( $k = 1, 2, \dots, T$ ),

and  $X_k = \begin{bmatrix} x_{11}(t_k) & \dots & x_{1m}(t_k) \\ \vdots & \ddots & \vdots \\ x_{n1}(t_k) & \dots & x_{nm}(t_k) \end{bmatrix}$ ,  $k = 1, 2, \dots, T$ .

The limit  $w^T w = 1$ , i.e. the maximum eigenvalue  $\lambda_{\max}$  of the matrix  $H$  is obtained. If  $w$  is taken as the eigenvector corresponding to  $\lambda_{\max}$ ,  $\sigma^2$  has the maximum value. At this point,  $\max w^T H_k w = \lambda_{\max}$ , and after normalizing the eigenvector  $w$ , the weight  $w_j$  can be obtained. Obtain the dynamic total evaluation value of the evaluation object.

This paper constructs an evaluation system of financial cooperation between China and the five southwestern peripheral countries from 1992 to 2022 and measures the level of financial cooperation between China and the five peripheral countries in terms of five levels of cooperation events, namely financial infrastructure, financial institutions, financial markets, currencies, and financial regulation.

First, construct the initial matrix in chronological order  $t_k \{x_{ij}(t_k)\}$  ( $i = 1, 2, \dots, 5$ ;  $j = 1, 2, \dots, 5$ ), in this paper, the data are standardized, then,  $\{x_{ij}(t_k)\}$  respectively in  $H_k = X_k^T X_k$  ( $k = 1, 2, \dots, T$ ), the sum of  $H = \sum H_k$  gives  $H$ :

$$H = \begin{bmatrix} 21249.50 & \dots & 12097.25 \\ \vdots & \ddots & \vdots \\ 12097.25 & \dots & 11926 \end{bmatrix}$$

Using MATLAB software, the maximum eigenvalue of the symmetric matrix  $H$  is calculated as  $\lambda_{\max} = 100901.208$  and the corresponding eigenvector is  $w$ :

$$w = (0.433, 0.598, 0.569, 0.198, 0.304)^T$$

The weight coefficients of each index are obtained by normalization of the feature vector  $w$  in the following table:

Table 3. Weight of financial cooperation indicators, source: Authors' own elaboration

Index name	Index weight
Financial infrastructure cooperation	0.206
Cooperation of financial institutions	0.284
Financial market cooperation	0.270
Monetary cooperation	0.094
Cooperation in financial supervision	0.145

Finally, according to formula (1), the financial cooperation index between China and the five southwest neighboring countries is calculated, as shown in Figure (1) below. The results show that the level of financial cooperation between China and the five neighboring countries in southwest China is steadily improving, but there are big differences between countries. The overall level of financial cooperation is low, and the index level does not exceed 40. In terms of specific countries, the level of financial cooperation between China and Vietnam is the highest among the five countries, and Thailand ranks second. This may be due to the inclusion of cross-border financial cooperation in the event sorting process. Vietnam, which borders Yunnan and Guangxi, has a unique advantage in border financial cooperation, so the level of financial cooperation measured by events is significantly higher than that of Thailand. The level of financial cooperation between China Laos and Myanmar is similar, with the level of financial cooperation in 2022 being 27.63 and 28.5 respectively. As can be seen from the figure, China has the lowest level of financial cooperation with Cambodia, which may be because the level of cooperation in financial institutions and financial markets lags behind that of other countries.

In addition, the financial cooperation between China and the five neighboring countries presents two important points. It was in 2008 that the level of financial cooperation between China and the neighboring countries in southwest China showed significant fluctuation for the first time. After the financial crisis, most countries have strengthened financial supervision and international cooperation, and China has also improved its international financial influence by constantly promoting the internationalization of RMB. Therefore, neighboring countries have turned to China to seek opportunities for financial cooperation with our country. Subsequently, under the implementation of the *Belt and Road Initiative*, the financial cooperation between China and neighboring countries ushered in a second large-scale growth point. Since 2013, financial cooperation with neighboring countries has increased significantly and continuously. However, from 2019 to 2022, the COVID-19 triggered global economic recession and financial market fluctuations. Neighboring countries in Southwest China generally face problems such as economic downturn, shrinking foreign trade and blocked industrial chains, and the external environment for financial cooperation has become more complex. In response to the crisis, countries have adopted blockade measures and financial policy adjustments, which has limited the flow of cross-border people, which has reduced the efficiency of cooperation and hindered some financial projects. Due to the adjustment of economic priorities in the region, the differences over the allocation of financial resources and the coordination of policies increase the cooperation costs. So the growth of the financial cooperation index has slowed down. However, it is believed that with the boost of the RCEP agreement and the accelerated recovery of global finance, the level of financial cooperation between China and neighboring countries will continue to improve steadily in the future.

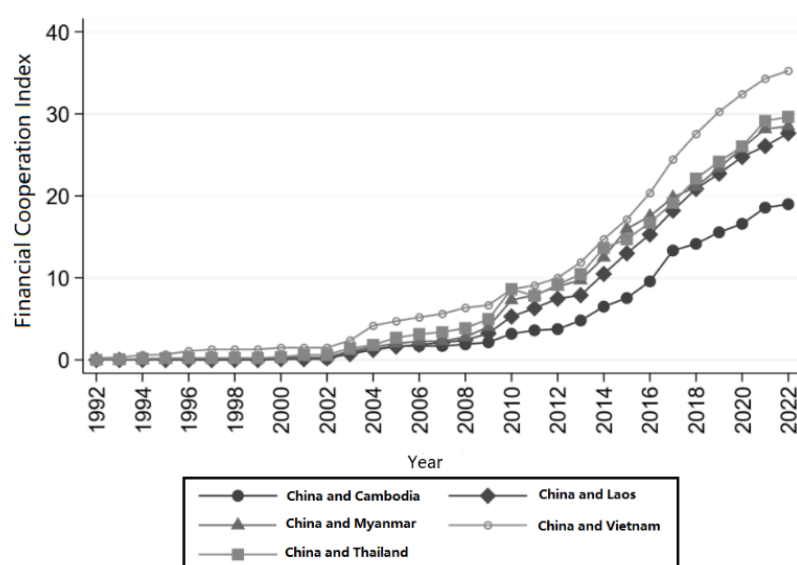


Figure 1. Financial cooperation index between China and the five neighboring countries in south-west China, source: Authors' own work

## 4. Empirical test

### 4.1. Research design

#### 4.1.1. Variables and data

##### (1) Explained variable

The level of financial cooperation index (LnFCI) between China and the five southwest neighboring countries measured in the previous paper is taken as the explanatory variable of this study. The index is constructed from five dimensions, namely financial infrastructure cooperation, financial institution cooperation, financial market cooperation, monetary cooperation, and financial regulatory cooperation, through the vertical and horizontal slotting method, to comprehensively evaluate the level of financial cooperation between China and the southwestern neighboring countries, which has a high degree of objectivity and accuracy.

##### (2) Core explanatory variable

Political distance (PD). Referring to the research methods (Zhong and Chen 2024; Sheng and Hussain 2021), this paper adopts the Global Governance Index (WGI) to measure the political distance between countries. The KSI method (Gallucci et al., 2023) is used to measure the distance, and the calculation formula is as follows:



$$PD_{it} = \frac{1}{6} \sum_{k=1}^6 (P_{ikt} - P_{ckt})^2 / V_{kt} \quad (4)$$

$PD_{it}$  is the political distance between country  $i$  and our country in  $t$  years,  $P_{ckt}$  is the index data of our country in  $t$  years and  $k$  dimension,  $P_{ikt}$  is the index data of country  $i$  in  $t$  years and  $k$  dimension, and  $V_{kt}$  represents the variance of all countries in  $t$  years and  $k$  dimensions.

Economic distance (ED). Economic distance is represented by the Economic Freedom Index (EFI) published by the Heritage Foundation. EFI is used as a proxy variable for economic distance because it assesses the degree of economic freedom through a series of indicator-specific metrics, a multidimensional assessment that provides a more comprehensive picture of the country's economy. In contrast, GDP cannot fully reflect a country's true output and standard of living. It is therefore more reasonable to choose the Index of Economic Freedom as a measure of economic distance.

According to the availability and scientificity of data, this paper selects five indicators: tax burden, government point out, commercial freedom, monetary freedom, and investment freedom. The calculation formula is as follows:

$$ED_{it} = \frac{1}{5} \sum_{k=1}^5 (E_{ikt} - E_{ckt})^2 / V_{kt} \quad (5)$$

Among them,  $EH_{it}$  is the economic distance between country  $i$  and China in  $t$  years,  $E_{ckt}$  is the index data of China in  $t$  years and  $k$  dimensions,  $E_{ikt}$  is the index data of country  $i$  in  $t$  years and  $k$  dimensions, and  $V_{kt}$  represents the variance of all countries in  $t$  years and  $k$  dimensions.

Financial distance (FD). Definition based on level of financial development (Kogut and Singh 1988), this paper selects data from six dimensions of depth, scale, and efficiency of financial institutions and markets as indicators to measure national financial distance. The data comes from the IMF database. The KSI method is also used to calculate the financial distance, and the calculation formula is as follows:

$$FD_{it} = \frac{1}{6} \sum_{k=1}^6 (F_{ikt} - F_{ckt})^2 / V_{kt} \quad (6)$$

Among them,  $FH_{it}$  is the financial distance between country  $i$  and China in  $t$  years,  $F_{ckt}$  is the index data of our country in  $t$  year  $k$  dimension,  $F_{ikt}$  is the index data of country  $i$  in  $t$  years and  $k$  dimensions, and  $V_{kt}$  represents the variance of all countries in  $t$  years and  $k$  dimensions.

Cultural distance (CD). Domestic and foreign scholars usually base their work on Kogut and Singh's (Tinbergen 1962) cross-country cultural distance model and Hofstede is the most commonly used database for measuring cultural distance between countries. However, this database does not fully include the main body of research in this paper, so the measurement of cultural distance is re-selected to the proportion of women in the labor force, the gross enrollment rate of higher education, scientific and technological journal articles, three indicators, the indicator data are from the World Bank. The specific formulas are as follows:

$$CD_{it} = \frac{1}{3} \sum_{k=1}^3 (C_{ikt} - C_{ckt})^2 / V_{kt} \quad (7)$$

Among them,  $CD_{it}$  is the cultural distance between country  $i$  and our country in  $t$  years,  $C_{ckt}$  is the index data of our country in  $t$  years and  $k$  dimension,  $C_{ikt}$  is the index data of country  $i$  in  $t$  years and  $k$  dimension, and  $V_{kt}$  represents the variance of all countries in  $t$  years and  $k$  dimensions.

### (3) Control variable

Inflation rate (INF). Inflation is an important indicator of the level of real interest rates, reflecting the creditworthiness of a country's currency, and in international flows, capital tends to flow to countries with creditworthy currencies, thus affecting the country's financial development. This paper uses the World Bank's measure of inflation as measured by the Consumer Price Index.

The size of the national economy (LnGDP and LnCGDP): Generally speaking, the economic development of a country also brings about the financial development of the country, which affects international financial cooperation, so GDP has an impact on a country's financial cooperation. In this paper, the GDP of the five Southwest Neighbouring Countries and China are selected as economic scale indicators and logarithmic treatment, the data source is the World Bank.

Infrastructure (LnTELE): Good infrastructure facilitates financial cooperation, reduces cooperation costs, and improves cooperation efficiency. The level of infrastructure is measured by the number of mobile devices per 100 people, and it is logarithmically processed. Data from the World Bank WDI database.

Natural resources abundance (LnNR). Natural resources abundance attract a large amount of financial cooperation motivated by resource extraction. In this paper, we choose to measure the rent of natural resources as a share of GDP. The data source is the World Bank.

Considering the availability and validity of data, data from five neighboring countries, namely Cambodia, Laos, Myanmar, Vietnam, and Thailand, from 1996 to 2022 are selected, and the specific data characteristics are shown in Table (4).

Table 4. Description of variables, source: Authors' own work

Variable type	Variable name	Observed value	Mean value	Standard Deviation	Minimum value	Maximum value
Explained variable	LnFCI	111	1.649	1.502	-2.272	3.562
Core explanatory variable	PD	111	1.526	1.036	0.226	4.170
	ED	111	1.745	1.291	0.049	5.590
	FD	111	1.971	1.009	0.237	3.691
	CD	111	3.111	0.866	2.021	4.948
	INF	111	5.251	5.812	-1.7	35
Control variable	LnGDP	111	3.843	1.593	0.565	6.299
	LnCGDP	111	12.927	0.814	11.182	14.006
	LnTELE	111	3.549	1.652	0	5.204
	LnNR	111	1.343	0.793	-0.357	2.760

#### 4.1.2. Model construction

This paper uses the gravity model of trade as a benchmark model to study the influence of multidimensional distance between countries on financial cooperation. The gravity model of trade was originally extended to the field of international trade by Tinbergen (1962) and Poyhonen (1963), usually considering economic size and geographical distance factors. With the continuous expansion of the gravity model, related research has introduced institutional factors, technical level, inflation, and other influencing factors into the model. At present, the gravity model has become one of the mainstream methods in analyzing the influence of macro variables on outbound investment and cross-border M&A activities of financial institutions. Therefore, according to the model intuition, robustness and applicability, this paper further extends and adjusts the model to establish a regression model suitable for explaining bilateral financial cooperation in this paper.

$$\begin{aligned}
 \text{LnFCI}_{it} &= \alpha_0 + \alpha_1 \text{PD}_{it} + \alpha_2 \text{INF}_{it} + \alpha_3 \text{LnGDP}_{it} + \alpha_4 \text{LnCGDP}_{jt} + \alpha_5 \text{LnTele}_{it} + \alpha_6 \text{LnNR}_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (8) \\
 \text{LnFCI}_{it} &= \alpha_0 + \alpha_1 \text{ED}_{it} + \alpha_2 \text{INF}_{it} + \alpha_3 \text{LnGDP}_{it} + \alpha_4 \text{LnCGDP}_{jt} + \alpha_5 \text{LnTele}_{it} + \alpha_6 \text{LnNR}_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (9) \\
 \text{LnFCI}_{it} &= \alpha_0 + \alpha_1 \text{FD}_{it} + \alpha_2 \text{INF}_{it} + \alpha_3 \text{LnGDP}_{it} + \alpha_4 \text{LnCGDP}_{jt} + \alpha_5 \text{LnTele}_{it} + \alpha_6 \text{LnNR}_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (10) \\
 \text{LnFCI}_{it} &= \alpha_0 + \alpha_1 \text{CD}_{it} + \alpha_2 \text{INF}_{it} + \alpha_3 \text{LnGDP}_{it} + \alpha_4 \text{LnCGDP}_{jt} + \alpha_5 \text{LnTele}_{it} + \alpha_6 \text{LnNR}_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (11)
 \end{aligned}$$

Among them,  $\text{LnFCI}_{it}$  is the bilateral financial cooperation index between China and southwest neighboring countries  $i$  at  $t$  time;  $\text{PD}_{it}$ ,  $\text{ED}_{it}$ ,  $\text{FD}_{it}$ , and  $\text{CD}_{it}$  represent the political distance, economic distance, financial distance, and cultural distance between China and the neighboring countries in the southwest at  $t$  time, respectively.  $\text{INF}_{it}$  is the rate of inflation;  $\text{LnGDP}_{it}$  is the economic scale of country  $i$  among the five neighboring countries at time  $t$ ;  $\text{LnCGDP}_{jt}$  is the  $t$  time economic scale of China;  $\text{LnTele}_{it}$  is the infrastructure level of country  $i$  at time  $t$ , and  $\text{LnNR}_{it}$  is the natural resource abundance of country  $i$  at time  $t$ .

#### 4.2. Reference regression

If there is a unit root in the panel data, the panel regression model built on this data may have pseudo-regression, so the panel data should be tested for unit root before the underlying regression to ensure the smoothness of the data. In this paper, the IPS test is chosen to test the smoothness of the panel data. Since most of the variables do not pass the IPS test, which indicates that the variables of political distance, economic distance and cultural distance are non-stationary panel data, in order to ensure the accuracy of the regression results as much as possible, this paper further conducts the KAO cointegration test for each variable.

Using the KAO test, Table 5 reports five different test statistics, mainly focusing on the first three: MDF, DF, ADF, whose corresponding p-values are all less than 0.01, so the original hypothesis of *there is no cointegration* can be rejected at the 1% level, and it is considered that there is a cointegration relationship between the model variables, i.e., there is a stable long-term equilibrium relationship between the explanatory variables, namely, the multidimensional distance of financial cooperation and explanatory variables, thus avoiding the pseudo-regression problem.

Based on the results of the Hausman test, this paper uses two-way fixed effects for the benchmark regression. The univariate regression is conducted first. The results show that all distances significantly promote financial cooperation, except for the results of economic distance, which are not significant (Table 6). Next, control variables are added and the regression results are shown in Table (7).

Table 5. Panel data robustness tests, source: Authors own computation

KAO Test	Statistic	p-value
Modified Dickey-Fuller t	-1.9473	0.0258
Dickey-Fuller t	-4.3637	0.0000
Augmented Dickey-Fuller t	-2.7495	0.0030
Unadjusted modified Dickey-Fuller t	-1.7287	0.0419
Unadjusted Dickey-Fuller t	-4.3055	0.0000

Table 6. Univariate regression results, source: Authors own computation

Variables	(1)	(2)	(3)	(4)
PD	0.215*** (0.068)			
ED		0.074 (0.047)		
FD			0.164** (0.072)	
CD				0.122** (0.053)
_cons	-2.112*** (0.327)	-1.780*** (0.318)	-2.150*** (0.368)	-2.240*** (0.389)
Individual Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	111	111	111	111
R2	0.969	0.966	0.967	0.967

Political distance has a positive effect on financial cooperation between China and its southwestern neighbours, and it is significant under the level of 1%. Most of the countries in our southwestern neighborhood are countries with low-quality political systems, while our political system is more complete, with a good political environment, efficient administrative efficiency and a fair and transparent legal system. Neighboring countries in the strong *system escape motivation* (Kolstad and Wiig, 2012) driven by the use of political differences, in China's superior political environment to carry out financial cooperation can lead to cooperation in the legitimate rights and interests of the protection, but also from the financial cooperation to obtain the stability of the expected return, reduce financial risks.

The positive effect of economic distance on the financial cooperation between China and the neighboring countries in the southwest is significant under the level of 1%, which is consistent with the conclusions of Tian B and Deng C (Jiang and Jiang, 2012). There are big differences between China and southwest neighboring countries in tax burden, government expenditure, business freedom, monetary freedom, etc. Under different economic systems, China can provide capital and technical support to southwest neighboring cooperative countries, while neighboring countries can provide market potential and business opportunities, and make full use of comparative advantages to broaden the space of financial cooperation. In addition, in the process of regional economic integration, China actively carries out bilateral trade, foreign investment, and other economic exchanges with neighboring countries, gradually reducing the losses caused by barriers, reducing the cost of cooperation, and providing a broad market demand for financial cooperation.

Financial distance also has a positive and significant impact on the financial cooperation between China and the southwestern countries. This may be due to the fact that, driven by the policy of foreign financial cooperation, our financial institutions have begun to seek cooperation targets. The vast majority of these financial institutions are state-owned enterprises (SOEs), which, in addition to profit maximization motives, also have strong *non-market motives* and are able to bear more systemic risks (Song and Hou, 2024; Feng and Jing, 2021), and are able to effectively take advantage of *non-market behaviors* of neighboring countries to obtain relevant facilitation. They can effectively utilize the *non-market behaviors* of neighboring countries to obtain relevant facilitation. As countries with big financial differences have different financial markets and financial systems, while Myanmar, Laos and other countries have a late start in financial development and are relatively backward in development, with greater potential for financial market development, in order to better adapt to the local market and customer needs, financial institutions have a lot of room for innovation and localization to improve their products and services, which therefore brings more opportunities for financial cooperation.

Although many studies have argued that the *outsider disadvantage* brought about by cultural distance hinders economic exchanges, this paper argues that cultural differences can, to a certain extent, serve as a kind of capital for financial institutions to bring the advantages of their own unique cultural systems to bear on financial cooperation. Cultural differences have brought new perspectives and creativity to finan-

cial cooperation, providing a basis for diversified forms of cooperation among financial institutions. Different countries have unique cultural backgrounds and resources, and such cultural differences produce *reverse resonance* rather than *similar attraction* (Tinbergen, 1962), prompting bilateral countries to seek cultural complementarities while also adding vitality to financial cooperation.

Table 7. Results of multidistance benchmark regression, source: Authors' own computation

Variable	(1)	(2)	(3)	(4)
PD	0.229*** (0.069)			
ED		0.158*** (0.052)		
FD			0.279*** (0.090)	
CD				0.292*** (0.073)
INF	-0.016** (0.007)	-0.015* (0.007)	-0.016** (0.008)	-0.018** (0.007)
LnGDP	0.061 (0.207)	0.419** (0.208)	-0.194 (0.247)	-0.296 (0.237)
LnCGDP	1.738*** (0.151)	1.397*** (0.177)	2.010*** (0.185)	2.176*** (0.191)
LnTELE	-0.020 (0.043)	-0.007 (0.044)	-0.070 (0.043)	-0.142*** (0.047)
LnNR	0.284** (0.128)	0.449*** (0.132)	0.321** (0.128)	0.356*** (0.123)
_cons	-21.766*** (1.672)	-18.982*** (1.860)	-24.316*** (1.932)	-26.352*** (2.043)
Individual fixation effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
N	111	111	111	111
R <sup>2</sup>	0.900	0.947	0.693	0.705

**Note:** \*\*\*, \*\* and \* are significant under the significance level of 1%, 5% and 10% respectively, and the Heteroskedasticity-RobustStandard Error is in parentheses, the same below.

#### 4.3. Robustness test

To verify the robustness of the conclusion, this paper intends to conduct the robustness test in the following two ways: First, the re-measurement of institutional distance; Second, re-measure the financial cooperation index. The test results are shown in Table 8 and Table 9. The results show that the direction and size of the regression coefficients of the core explanatory variables are consistent with the original conclusion, and the significance level is mostly consistent with the original conclusion, so the regression results are robust.

##### 4.3.1. Institutional distance remeasurement

Considering that the KSI method was chosen in the measurement of political, economic, financial, and cultural distance mentioned above, to ensure the authenticity and reliability of the above empirical results, a new method was adopted to recalculate the multidimensional distance. In this paper, the standard Euclidean distance method (EDI) is used to recalculate the four distances. The specific formula is as follows.

$$PD_{it}' = \sqrt{\sum_{k=1}^6 (P_{ikt} - P_{ckt})^2 / V_{kt}} \quad (12)$$

$$ED_{it}' = \sqrt{\sum_{k=1}^5 (E_{ikt} - E_{ckt})^2 / V_{kt}} \quad (13)$$

$$FD_{it}' = \sqrt{\sum_{k=1}^8 (F_{ikt} - F_{ckt})^2 / V_{kt}} \quad (14)$$

$$CD_{it}' = \sqrt{\sum_{k=1}^3 (C_{ikt} - C_{ckt})^2 / V_{kt}} \quad (15)$$

The re-regression results are shown in Table (8). The re-measured multidimensional distance also has a significant positive effect on financial cooperation, therefore, the robustness test indicates that the above empirical results are reliable.

Table 8. Robustness tests – regime distance remeasurement, source: Authors' own computation

Variant	(1)	(2)	(3)	(4)
PD'	0.227*** (0.070)			
ED'		0.189*** (0.067)		
FD'			0.303*** (0.101)	
CD'				0.582*** (0.153)
INF	-0.016** (0.007)	-0.015* (0.008)	-0.016** (0.008)	-0.018** (0.007)
LnGDP	0.050 (0.209)	0.391* (0.208)	-0.273 (0.268)	-0.303 (0.245)
LnCGDP	1.761*** (0.152)	1.400*** (0.182)	2.092*** (0.205)	2.146*** (0.192)
LnTELE	-0.029 (0.042)	0.004 (0.047)	-0.083* (0.044)	-0.129*** (0.046)
LnNR	0.289** (0.129)	0.460*** (0.135)	0.354*** (0.128)	0.359*** (0.124)
_cons	-22.299*** (1.698)	-19.180*** (1.871)	-25.498*** (2.180)	-26.810*** (2.176)
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
N	111	111	111	111
R <sup>2</sup>	0.892	0.951	0.635	0.702

#### 4.3.2. Re-measurement of the Financial Cooperation Index

To ensure the reliability of the research results, the measurement method of the financial cooperation index is replaced here, the financial cooperation index is remeasured using principal component analysis, and the remeasured financial cooperation index is used as an explanatory variable for the empirical test, and the regression results are shown below.

Table 9. Robustness tests – Financial Cooperation re-measurement, source: Authors' own computation

variant	(1)	(2)	(3)	(4)
PD	0.251*** (0.067)			
ED		0.154*** (0.051)		
FD			0.277*** (0.088)	
CD				0.322*** (0.070)
INF	-0.015** (0.007)	-0.013* (0.007)	-0.015* (0.007)	-0.017** (0.007)
LnGDP	0.142 (0.200)	0.516** (0.204)	-0.090 (0.243)	-0.254 (0.227)
LnCGDP	1.583*** (0.145)	1.243*** (0.174)	1.847*** (0.181)	2.069*** (0.182)
LnTELE	-0.011 (0.041)	-0.002 (0.044)	-0.064 (0.042)	-0.145** (0.045)
LnNR	0.303** (0.124)	0.473*** (0.130)	0.347*** (0.126)	0.383*** (0.118)
_cons	-20.113*** (1.613)	-17.347*** (1.829)	-22.603*** (1.896)	-25.183*** (1.951)
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
N	111	111	111	111
R <sup>2</sup>	0.910	0.917	0.737	0.702

#### 4.4. Heterogeneity test

##### 4.4.1. Tests for temporal heterogeneity

In 2010, the China-ASEAN Free Trade Area (FTA) became fully operational, and the establishment of the FTA has boosted economic growth and cooperation within ASEAN. Does this important point in time affect China's willingness and motivation to engage in financial cooperation with its southwestern neighbors? Therefore, this paper divides the sample into two stage sub-samples, 1996-2009 and 2010-2022, to explore whether there is temporal heterogeneity of multidimensional distance on financial cooperation. The results are presented in Table

Table 10. Regression results of heterogeneity analysis based on time dimension 1996-2009, source: Authors' own computation

Variant	(1)	(2)	(3)	(4)
PD	0.280 (0.314)			
ED		0.175 (0.149)		
FD			0.418** (0.194)	
CD				0.219 (0.466)
_cons	-23.595*** (7.093)	-18.905** (6.939)	-23.110*** (6.237)	-24.193** (8.920)
Control variables	Containment	Containment	Containment	Containment
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	46	46	46	46
<i>R</i> <sup>2</sup>	0.935	0.937	0.944	0.934

The regression results show that before the official launch of the ASEAN FTA, i.e. in the period 1996-2009, financial distance was significant above the 5 percent level, while political, economic, and cultural distance were not statistically significant. The reason for this is the Asian financial crisis and the global financial crisis during this period, and to cope with the crisis, Southwest Neighbours needs to seek external support and cooperation to stabilize the financial market. Against the backdrop of wide differences in financial development, the countries recognize that only through cooperation and enhanced communication and coordination in financial policy and regulation can they more effectively address problems in the financial sector and work together to maintain financial market stability to enhance the level of financial security in the region as a whole.

Table 11. Regression results based on heterogeneity analysis of time dimension 2010-2022, source: Authors' own computation

variant	(1)	(2)	(3)	(4)
PD	0.064*** (0.021)			
ED		0.035** (0.019)		
FD			-0.044 (0.032)	
CD				0.073*** (0.021)
_cons	-12.851*** (0.796)	-12.132** (1.064)	-13.002*** (0.880)	-14.426*** (0.814)
Control variables	Containment	Containment	Containment	Containment
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	65	65	65	65
<i>R</i> <sup>2</sup>	0.992	0.991	0.991	0.992

##### 4.4.2. Geographic heterogeneity test

Considering the special geographical relationship between Cambodia, Laos, Myanmar, Vietnam Thailand, and China, this paper analyzes the mechanism of multidimensional distance on financial cooperation from the perspective of regional heterogeneity from the perspective of whether they border China or not.

Table 12 shows the regression results for the border group with Laos, Myanmar, and Vietnam as subjects. The results show that financial cooperation between China and its southwestern neighbors is affected by political, financial, and cultural distance, and the effect is significantly positive. Table 13 shows the regression results of the non-border group with Cambodia and Thailand as the subjects. The results show that economic and cultural distance have a significant effect on China's financial cooperation with Cambodia and Thailand. It can be seen that

Table 12. Results of heterogeneity test based on bordering groups, source: Authors' own computation

Variant	(1)	(2)	(3)	(4)
PD	0.261** (0.021)			
ED		-0.107 (0.104)		
FD			0.522 (0.151)	
CD				0.459*** (0.021)
_cons	-9.619* (5.90)	-14.482** (6.048)	-12.503** (5.033)	-16.252*** (5.383)
Control variables	Containment	Containment	Containment	Containment
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
N	61	61	61	61
R <sup>2</sup>	0.982	0.979	0.984	0.983

Table 13. Results of heterogeneity test based on non-bordering groups, source: Authors' own computation

Variant	(1)	(2)	(3)	(4)
PD	0.201 (0.164)			
ED		0.279** (0.111)		
FD			0.125 (0.222)	
CD				0.364** (0.157)
_cons	-24.212*** (3.337)	-23.344*** (2.354)	-23.528*** (4.382)	-27.253*** (3.359)
Control variables	Containment	Containment	Containment	Containment
Individual fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	Yes	Yes	Yes	Yes
N	50	50	50	50
R <sup>2</sup>	0.992	0.994	0.991	0.994

multidimensional distance significantly promotes financial cooperation, but there is a threshold for this promotion due to different geographical locations, which shows geographical heterogeneity. The reason is that Laos, Myanmar, and Vietnam, despite their political, financial, and cultural differences with China, have actively promoted in-depth financial exchanges along the border due to their endowed geographical advantages and the effect of *institution escape*, thus realizing the significant progress of financial cooperation along the border. The facilitating effect of economic distance is only evident in the process of financial cooperation between China Cambodia and Thailand, probably because Cambodia and Thailand have more open economic policies, which provide a favorable investment environment and opportunities for Chinese capital. In addition, the effect of cultural distance on financial cooperation is not affected by geographical distance, which may be because Chinese financial institutions have gradually improved mutual understanding and trust through enhanced personnel training and cultural exchanges. This cultural integration has helped to increase the willingness and efficiency of both parties to cooperate.

## 5. Conclusions and policy implications

### 5.1. Conclusions

This paper focuses on China's relations with the five southwest neighboring countries, constructs a financial cooperation index between China and the five neighboring countries, examines the impact of multidimensional distance between countries on the level of financial cooperation based on the analysis of factual characteristics, and further explores the temporal and geographical heterogeneity of such impact. The findings of this paper are summarised below:

First, there are differences in the level of financial cooperation between China and the five southwestern neighboring countries, and the overall level of financial cooperation is low. China's financial cooperation with the five neighboring countries has seen two significant increases, especially after the Belt and Road Initiative was put forward in 2013. China has provided financial support through the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund, while promoting the internationalization of the RMB, establishing a cross-border payment system (CIPS) and currency swap agreements, and optimizing trade settlement. Policy-based financial institutions, such as the Export-Import Bank of China and the China Development Bank, provide concessional loans to help the economic development of countries along the Belt and Road, when financial cooperation tended to develop rapidly (see figure 2). Second, multidimensional distance is beneficial to financial cooperation between China and the five southwestern neighboring countries, with cultural distance having the greatest impact. The role of distance in financial cooperation has two faces, and this paper finds that in the study of financial cooperation with neighboring countries, financial cooperation can be facilitated by the comparative advantages and complementary effects generated by distance, and in the context of multidimensional distance, it can more comprehensively analyze and assess the risks and benefits, and then formulate financial cooperation plans in more detail, forcing the field of financial cooperation to be refined and deepened. Third, the impact of multidimensional distance on financial cooperation between China and its five southwest neighbors is heterogeneous in terms of time and geography. In terms of time heterogeneity, before the establishment of the ASEAN Free Trade Area, the Asian financial crisis and the global financial crisis had a profound impact on the financial cooperation between China and the five countries in southwest China. The financial crisis has exacerbated countries' concerns about financial risks, especially in transnational capital flows, regulatory coordination and information sharing, and the lack of trust and collaboration, thus limited financial cooperation. With the establishment of the ASEAN Free Trade Area, especially the gradual deepening of the free trade area agreement, the economic cooperation between China and South-east Asian countries has entered a new stage. Under the framework of common development, political, economic and cultural distance plays a prominent role and provides strong support for financial cooperation in a complementary and mutually beneficial way. In terms of regional heterogeneity, the influence of political, economic and financial distance is influenced by geographical factors. Laos, Myanmar and Vietnam, with their geographical advantages and governance systems, have promoted in-depth exchanges of border finance and made remarkable progress. Because of their relatively open economic policies, China, Cambodia and Thailand provide good investment opportunities for Chinese capital, which can promote the economic distance. The impact of cultural distance on financial cooperation is not limited by geographical factors, because Chinese financial institutions have enhanced understanding and trust and cooperation willingness and efficiency.

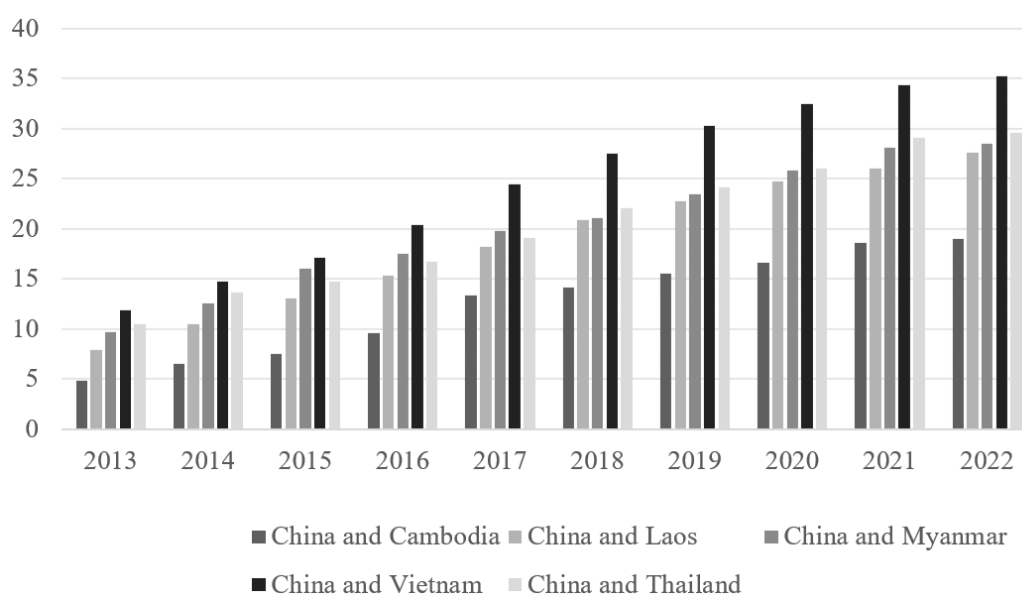


Figure 2. Financial cooperation index 2013-2022, source: Authors' own work

## 5.2. Policy implications

### 5.2.1. Crossing political distance to build a new chapter of financial cooperation

Strengthen political communication and mutual trust, enhance mutual understanding and confidence among countries through high-level visits and regular meetings, and create a favorable political environment for financial cooperation. Promote financial policy coordination, strengthen cooperation and exchanges among financial regu-



lators, jointly formulate and implement financial policies, prevent financial risks, and promote the sound development of financial markets. Expand the field of financial cooperation, and on the basis of traditional financial institutions, financial markets, and financial business cooperation, explore new areas of cooperation, especially in green finance and digital finance. This not only provides financial support and technological innovation for the realization of sustainable development goals but also promotes environmental protection and social inclusion.

#### *5.2.2. Grasping the pulse of the economy and deepening new opportunities for financial cooperation*

Carry out in-depth macroeconomic analysis, pay close attention to changes in the economic situation of southwest neighboring countries, grasp the economic development trend, and strengthen market analysis. Strengthen economic relations between China and neighboring countries and enhance bilateral complementarity through bilateral trade, bilateral investment, and other economic activities. Promote national cooperation in the financial field, realize the rational allocation of resources and common development, and reduce the inequality within and between countries. Classify and implement policies for countries or regions with different economic distances in financial cooperation. For countries with small economic differences, we can enhance financial market connectivity and promote innovation in financial products and services. For regions with large economic differences, we can reduce cooperation risks and improve cooperation efficiency by establishing financial cooperation platforms and strengthening information sharing.

#### *5.2.3. Optimising financial facilities and exploring new frontiers of financial cooperation*

A complete financial infrastructure system is the basic guarantee for the safe and efficient operation of financial markets. We will build Yunnan and Guangxi provinces into open financial portals for neighboring countries, actively implement policies and measures related to connectivity under the Belt and Road Initiative, further improve payment and clearing systems and credit investigation systems, and build long-term cooperative partnerships. The difficulty and cost of information acquisition caused by differences need to be compensated by information-sharing platforms. Based on information sharing, we should raise the requirements for financial infrastructure, promote the construction of financial infrastructure in a differentiated manner, and expand the scope of cooperation by relying on the mode of assistance cooperation in which the countries with the priority level of financial development lead the backward countries, to cover the construction of financial infrastructure in ASEAN.

#### *5.2.4. Discovering cultural resources and promoting new development of financial cooperation*

The cooperation of financial institutions, led by the cooperation of the banking industry, is the focus of China and the neighboring countries in the southwest at this stage, and the innovation of products and services is the inevitable trend of financial cooperation. Given the development model and characteristic culture of neighboring countries, China has developed financial products with national cultural characteristics through differentiation and innovation and innovated overseas investment loans and cultural tourism loans. The cooperation of the insurance industry can provide an effective guarantee for the economic and trade financial activities between China and neighboring countries, so strengthening the construction of cross-border insurance service centers has become a key part of financial cooperation. Mobilize the enthusiasm of insurance institutions for cross-border financial cooperation, strengthen cross-border exchanges and cooperation between insurance departments, use cultural elements to innovate and design insurance products to narrow the distance between China and neighboring countries, and further promote broader economic cooperation and inclusive development.

#### *5.3. Limitations and future research*

There are also some limitations in this paper: (1) The collection of financial cooperation events at this stage may be incompletely selected, and since the financial cooperation index of this study is affected by the number of events, the incompleteness of the events may lead to the overall financial cooperation index, which will make the measurement results inaccurate. (2) Due to data constraints, the indicators for re-measuring cultural distance may be relatively homogeneous, and with follow-up surveys and diversified data collection, the cultural differences between China and its neighboring countries will be better reflected. Therefore, the conclusions drawn in this study are only a series of speculations based on the methodology used in this study, and their reasonableness and correctness are subject to more in-depth research on the basis of obtaining more comprehensive and abundant data, and the correct use of other weighting measurement methods.

#### **Data Availability**

The data supporting the findings of this study are available within the article. Additional datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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