

# Research on the Mechanism of Interregional Financial Cooperation under the Reform of the International Financial System: A Case Study on Chinese Mainland and Taiwan

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**Abstract:** The international economic and financial order is currently undergoing a profound transformation period, with risks and opportunities coexisting. And a multi-channel and multi-level regional financial cooperation mechanism is gradually taking shape and being launched. Cross-strait financial cooperation is an important practice of regional financial cooperation under the background of globalization, world multi-polarization and economic diversification, which plays an irreplaceable role in effectively promoting the steady economic growth of both sides and maintaining financial stability and security. Based on the discussion of the above issues, this paper analyzes the theoretical logic of the cross-strait financial cooperation mechanism by using the repeated game method, and puts forward specific suggestions on the construction of the cooperation mechanism.

**Keywords:** Reform of the International Financial System, Mechanism of Interregional Financial Cooperation, Chinese mainland and Taiwan, Repeated game

## 1. Introduction

Regional financial cooperation has always been a core issue in the field of financial development. Its internal driving force comes from closer regional economic connections and the benefits that can be obtained by participating in them. From a theoretical perspective, the existing optimal currency area theory (OCA) has extensively discussed the conditions, costs, and benefits of regional financial cooperation and monetary integration, but few studies have conducted in-depth analysis of the necessity of regional financial cooperation. In practice, compared to Europe, North America, and other regions, financial cooperation in East Asia has been progressing slowly. As an important component of the East Asian economy, although investment and trade ties are close, financial cooperation between the two sides of the Straits is also relatively lagging, which is not conducive to the stable development of the cross-strait economy. After 2008, the global economic and financial system underwent profound changes, providing opportunities for cross-strait financial cooperation. Based on the above background, this paper will use game theory tools to discuss the necessity of cross-strait financial cooperation and propose suggestions for the mechanism of cross-strait financial cooperation, which is the theoretical contribution of this article.

## 2. Challenges and Opportunities Given by the Reform of the International Financial System

From the history of changes in the international financial system, we can find that the premise for the stability and effective operation of the international financial system is that the pattern of international financial power matches the pattern of international economic power. The existing "dollar standard" system has fully exposed its own shortcomings under the impact of many economic and financial crises. The increasing global economic imbalance, the greater attention paid to the interests of developing countries, and the rise of the form of self-help and mutual assistance in regional economy and finance will accelerate the withdrawal of the "dollar standard" from the historical stage, which also disproves the obvious mismatch between the financial power pattern and the economic pattern. At the same time, backed by the solid economic foundation of Chinese Mainland, the RMB officially entered the world stage in 2016, providing new ideas and options for the reform of the existing international monetary system and the construction of a new international monetary system.

However, the reform was not achieved overnight, and all economies could not avoid the pain caused by the replacement of old and new systems. The existing international financial system has fallen into an inefficient and unstable state of contradiction, increasing the risk of all economies participating in international economic and financial activities. Under current international financial framework, the core issues of the international financial system, the international standard monetary system, the exchange rate system and the balance of payments system, have no corresponding institutional arrangements and constraints. There are also some problems in the design of crisis prevention and mitigation mechanism.

Meanwhile, the decision-making and discourse power of IMF and the World Bank, which are important carriers of the international financial system, are concentrated in a few developed countries such as Europe and America (see Table 1), and the realization of the interests of the vast majority of economies cannot be guaranteed with fairness and equality.

*Table 1: Comparison of Voting Rights of the Major Economies in IMF*

Time(year)	2008(unit:%) (executed in 2011)	Ranking(after 2011)	2010(unit:%) (executed in 2016)	Ranking(after 2016)
USA	16.72	1	16.47	1
Japan	6	2	6.14	2
German	5.86	3	5.31	4
France	4.84	4	4.02	5
U.K.	4.84	4	4.02	5
Chinese mainland	3.65	6	6.06	3

Data resource: IMF

In view of their disappointment with the existing international financial system, so many economies have carried out a series of fruitful cooperation in the field of regional cooperation in order to prevent the spread and deepening of the crisis. At the bilateral level, the central banks of major economies before and after the international financial crisis, as well as their small and medium-sized neighboring countries, have also signed currency swap agreements to seek regional financial stability. At the regional level, the East Asian foreign exchange reserve has been officially established. ASEAN, China, Japan and South Korea have jointly established the Chiang Mai Initiative Multilateral Mechanism (CMIM) to help member countries that may have liquidity difficulties and prevent further crises. Europe has also established the European Financial Stability Facility (EFSF) and the European Financial Stability Mechanism (ESM) to maintain economic and financial stability in the euro area. All of these have undoubtedly provided ideas and experience for both sides of the Taiwan Straits to jointly respond to the changes in the international financial system.

### 3. Significance of establishing cross-strait financial cooperation mechanism

The trend of regional economic and financial cooperation is highlighted in the context of the functional defects of the international financial system, the instability of its own system and the continuous turbulence of the global economy. Such importance is embodied in two aspects.

First, cross-strait financial cooperation mechanism will promote common, stable and effective economic growth across the Straits<sup>[1]</sup>. The establishment of a highly constrained financial cooperation system is conducive to ensuring the effective flow of resources between the two sides of the Taiwan Straits, and thus promoting industrial upgrading, technological progress, institutional innovation and the discovery of new economic growth points, and finally making the two sides obtain greater economic benefits.

From the perspective of both sides of the Taiwan Straits, in order to cope with the new international economic situation, the mainland put forward the strategic plans of "Made in China 2025" and "the Belt and Road initiative", and determined new economic development strategies. Taiwan has successively put forward the industrial transformation strategy of "three industries and four modernizations", and proposed "six emerging industries", "four smart industries", and "ten key service industries" as the main direction of industrial upgrading. Then, how to realize the important supporting role of the financial industry in the economic integration and development is worth our deep thinking.

Second, cross-strait financial cooperation mechanism will maintain financial stability and security across the Straits. Combating the turbulence caused by frequent crises requires joint cooperation between the two sides of the Taiwan Straits. At present, both sides of the Straits are unable to bear the serious impact brought by the crisis alone, and should establish institutional financial cooperation

content. On the one hand, through the framework of financial information communication and exchange, financial development experience, technical support of expert platforms, etc., the competitiveness of the financial industry across the Straits can be improved before the crisis occurs, the financial system and system can be further improved, and potential financial risks and crises can be monitored and forewarned. On the other hand, after the occurrence of risks and crises, the effective rescue mechanisms such as adequate capital reserves, diversified and flexible rescue tools, and standardized rescue processes, can reduce the impact of the crisis on various fields across the Taiwan Straits. The expected uncertainty will be eliminated, and regional stability and stability will be maintained.

#### 4. The theoretical logic of cross-strait financial cooperation system design

The classic optimal currency area theory (OCA) only provides a theoretical basis for the conditions of financial cooperation and the cost and benefit of cooperation, but does not provide sufficient basis for the necessity of establishing an effective financial cooperation mechanism. Based on the non-cooperative game theory, this paper will explain that the establishment of financial cooperation system across the Taiwan Straits is the basis to ensure the realization of cooperation results.

##### 4.1 The choice of cross-strait financial cooperation under non-cooperative game

According to the theory of non-cooperative game, this paper assumes that for both sides of the Taiwan Strait, their respective behavioral strategy sets are {cooperation, neutrality, confrontation}, and the game behaviors and corresponding game results are divided into the following six types, which include (cooperation, cooperation) behavior, (neutrality, neutrality) behavior, (cooperation, neutrality) or (neutrality, cooperation) behavior, (cooperation, confrontation) or (confrontation, cooperation) behavior, (neutrality, confrontation) or (confrontation, neutrality) behavior, and (confrontation, confrontation) behavior. This paper will establish game models under three conditions: no external constraints or incentives, external incentives and external constraints, and further assign values to the game results, and show the game process across the Taiwan Straits in the form of game matrix. At the same time, it is assumed that the distribution of benefits between the two sides is average, which is valid and reasonable under the condition of high degree of competition in market conditions.

##### (1) No external constraints or incentives

The game matrix between the two sides of the Straits is as follows in Table 2. It can be seen from the game matrix that (cooperation, cooperation) = (20, 20) is a stimulating strategy. Under this strategy, the two sides can't improve their own profits without harming the interests of the other side, which is the Pareto optimal state. However, this state is unstable. Under the condition of rational choice, both sides of the Straits hope that the other side will choose cooperation, while their own choice is to destroy cooperation, that is, confrontation. In an unconstrained environment, the final equilibrium of the two sides is (confrontation, confrontation) = (-10, -10), which is a stable Nash equilibrium state, a Pareto suboptimal state, similar to the classic prisoner's dilemma in game theory.

Table 2: Cross-Strait Game Matrix without Constraints or Incentives

		Taiwan			Taiwan' s largest revenue
		Cooperation	Neutrality	Confrontation	
Chinese mainland	Cooperation	(20,20)	(10,25)	(-10,30)	30
	Neutrality	(24,10)	(10,10)	(-10,-10)	10
	Confrontation	(30,-10)	(10,-10)	(-10,-10)	-10
Chinese mainland' s largest revenue		30	10	-10	(confrontation,confrontation)

##### (2) External incentives

Without the intervention of stable external factors, it is impossible to reach a stable state of cooperation between the two sides of the Straits. In order to improve the overall welfare of both sides of the Straits, there must be credible conditions to fully balance the interests of each other and achieve Pareto improvement. In the case that the external conditions are appropriate incentives, the income of the "cooperation" strategy should be increased incrementally. The setting of increment should satisfy that the increased cooperation income is greater than the maximum income in (confrontation,

cooperation). From the game results, it can be seen that after giving incentives to cooperation strategies, the final game result turns to (cooperation, cooperation) = (31, 31), which is stable and consistent with the Pareto optimal Nash equilibrium. Not only the profits of both sides have increased, but also the overall welfare of both sides has improved. The game matrix between the two sides of the Straits is as follows in Table 3.

Table 3: Cross-Strait Game Matrix with External Incentives

		Taiwan			Taiwan' s largest revenue
		Cooperation	Neutrality	Confrontation	
Chinese mainland	Cooperation	(31,31)	(21,15)	(1,30)	31
	Neutrality	(24,21)	(10,10)	(-10,10)	21
	Confrontation	(30,1)	(10,-10)	(-10,-10)	1
Chinese mainland' s largest revenue		31	21	1	(cooperation,cooperation)

### (3)External constraints

External intervention factors can choose to punish "confrontation" and "neutrality" strategies. If taking away the benefits from one side who takes the above behavior, the equilibrium strategy achieved through the penalty mechanism is (cooperation, cooperation) = (20, 20). This result is consistent with the strategy choice obtained by external incentive conditions, but it can be found that both the overall interests of two sides and the individual benefit of each other are lower than the former situation. The game matrix between the two sides of the Straits is as follows in Table 4.

Table 4: Cross-Strait Game Matrix with External Constraints

e>a>b>0>c		Taiwan			Taiwan' s largest revenue
		Cooperation	Neutrality	Confrontation	
Chinese mainland	Cooperation	(20,20)	(10,17)	(-10,18)	20
	Neutrality	(17,10)	(2,2)	(-18,-2)	10
	Confrontation	(18,-10)	(-2,-18)	(-22,-22)	-10
Chinese mainland' s largest revenue		20	10	-10	(cooperation,cooperation)

To sum up, the financial cooperation between the two sides needs the intervention of external institutional factors. The game results can reach a stable Pareto state, and the overall and individual interests of the two sides can be maximized. The incentive institutional factors are more effective than restrictive institutional factors. Because it can avoid the difficult institutional design cost of "declaring war" against the existing interests of both sides. It is a typical "seeking common ground while reserving differences" economic exchange strategy.

## 4.2 The choice of cross-strait financial cooperation under repeated game

In view of the long-term nature of economic interests, this paper uses repeated games to prove that the Pareto optimal Nash equilibrium (cooperation, cooperation) of the previous non-cooperative game is the behaviors that the two sides should adopt to achieve common long-term interests in the long term.

Set the discount factor as  $\delta$  (That is, the discount coefficient of the second-round game income converted to the first round,  $0 < \delta < 1$ ). We will discuss the following scenarios.

### (1)Triggering strategy

Both sides have been cooperating until one side chooses another strategy and then it will be switch to that strategy and maintained. Under this condition, the profit of long-term cooperation is  $a/(1-\delta)$ , the neutral is  $d+b\delta/(1-\delta)$ , and the benefit of constant confrontation is  $e+c\delta/(1-\delta)$ . Then there are the following formulas:

$$a/(1-\delta) > d+b\delta/(1-\delta) \Rightarrow \delta > (d-a)/(d-b)$$

$$a/(1-\delta) > e+c\delta/(1-\delta) \Rightarrow \delta > (e-a)/(e-c)$$

The results show that when  $\delta$  is sufficiently large ( $\delta > \max\left\{\frac{d-a}{d-b}, \frac{e-a}{e-c}\right\}$ ), triggering strategy can guarantee (cooperation, cooperation) to be Nash equilibrium of infinite game.

## (2) "Tooth for Tooth" strategy

The last strategy of one side is the strategy chosen by the other side this time. Under this condition, the income of long-term cooperation is  $a + a\delta$ , the benefits of cooperation and neutrality alternation is  $d + b\delta$ , and the benefits of cooperation & confrontation is  $e + c\delta$ . Then the following formulas should be established:

$$a/(1-\delta) > d + b\delta/(1-\delta) \Rightarrow \delta > (d-a)/(d-b)$$

$$a/(1-\delta) > e + c\delta/(1-\delta) \Rightarrow \delta > (e-a)/(e-c)$$

The results show that when  $\delta$  sufficiently large ( $\delta > \max\left\{\frac{d-a}{d-b}, \frac{e-a}{e-c}\right\}$ ), the strategy of "tit for tat" can guarantee (cooperation, cooperation) the Nash equilibrium of infinite game. The "tooth for tooth" strategy needs to meet more stringent conditions than the trigger strategy.

## (3) "Forgiveness" strategy

Both sides always choose cooperation, and if the other side chooses to non-cooperate (neutral or confrontation), then one side chooses neutrality. Under this condition, the income of long-term cooperation is  $a/(1-\delta)$ , the income of neutrality is  $d + b\delta/(1-\delta)$ , and the gains from constant confrontation is  $e + b\delta/(1-\delta) > d + b\delta/(1-\delta)$ . Then the results of the following formulas will appear:

$$a/(1-\delta) > e + b\delta/(1-\delta) \Rightarrow \delta > (e-a)/(e-b) > (e-a)/(e-c)$$

It is concluded that when  $\delta$  is sufficiently large ( $\delta > \frac{e-a}{e-b}$ ), the "forgiveness" strategy can ensure that (cooperation, cooperation) is an infinite game Nash equilibrium, and vice versa (confrontation, confrontation). The "forgiveness" strategy needs to meet more stringent conditions than the "trigger" strategy.

## 5. Conception of Building Cross-strait Financial Cooperation Mechanism in an all-round Way

Accelerating cross-strait financial cooperation is an objective requirement of cross-strait economic development and cooperation, which is particularly urgent and necessary in the context of global financial reform. Not only classical theories but also regional financial cooperation practice remind us that in order to solve various difficulties faced by the two sides of the Taiwan Straits, we must establish an effective cooperation system as the fundamental guarantee. The overall framework of an effective cross-strait financial cooperation mechanism can include the following mechanisms.

### 5.1 Information exchange and sharing mechanisms

At present, the two sides of the Taiwan Straits conduct exchange information and risk prevention in the form of signing a memorandum of understanding (MOU) on regulatory cooperation. However, there are differences in risk prevention and supervision capabilities between the two sides of the Taiwan Straits, and they have failed to establish an effective information communication and sharing mechanism to prevent crises and risks from harming the cross-strait economy. A good information communication and sharing mechanism should not only include various platforms that can bring in-depth and full information exchange between the two sides of the Taiwan Straits, but also provide institutional guarantees for risk early warning and financial innovation. The specific mechanism design is shown in the figure below in Figure 1.

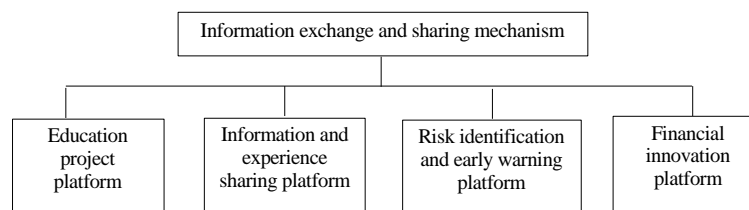


Figure 1. Information exchange and sharing mechanisms



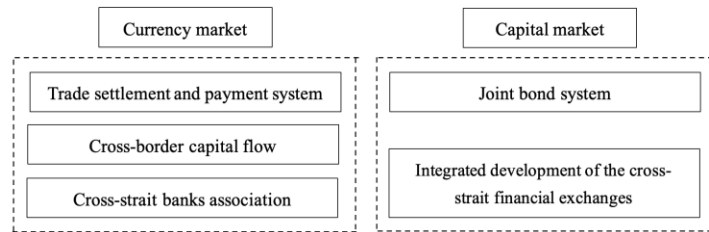


Figure 4. Cross-strait common market construction mechanisms

### 5.5 Currency Swap and Crisis Relief Mechanism

The last line of defense against risks outside the region and effective rescue after the crisis is the currency swap and crisis relief mechanism. The cross-strait currency swap agreement has many benefits. First of all, cross-strait currency swap can lower the threshold for RMB to flow into Taiwan and the threshold for new Taiwan dollar to flow into the mainland. Second, the signing of a currency swap agreement can expand the pool of RMB funds in Taiwan, that has been striving to become an offshore center of RMB. Third, based on the consideration of financial security, the establishment of a currency swap mechanism can reduce the risk of international hot money and the impact of the global financial crisis. The specific mechanism design is shown in the figure below in Figure 5.

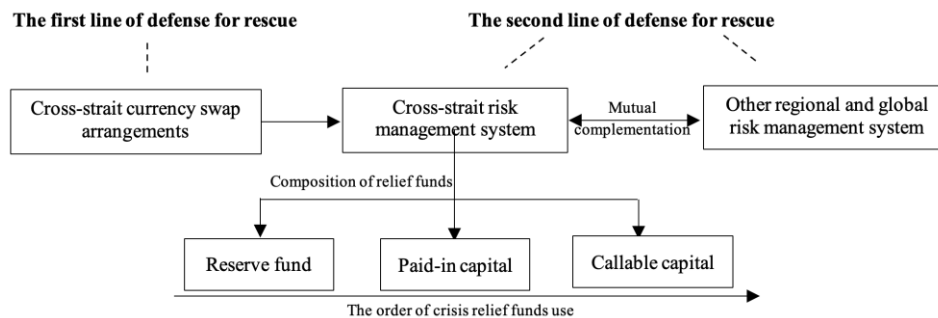


Figure 5. Currency Swap and Crisis Relief Mechanism

## 6. Conclusion

This paper introduces the cooperative game method, analyzes the equilibrium results of the game by establishing a game model under three conditions, and verifies that cross-strait financial cooperation requires external institutional factors to intervene in order to achieve a stable Pareto optimal result with maximum overall and individual interests. This is a beneficial supplement to the classical optimal currency area theory. Furthermore, on the basis of the above conclusions, the paper conducts institutional design and outlook depending on the existing cross-strait cooperation process, which are suitable for the current situation and characteristics of cross-strait cooperation. The construction of these mechanisms will be a powerful response to the changes in the international financial system, and an important means to promote the steady, sustained and effective growth of cross-strait economy, trade, investment and finance, thus to resist external shocks, and to improve the rescue capacity after crises and risks occur.

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