The Influence of Financial Derivatives Trading on the Stability of China's Financial Market

Zongrui Han

City University of Hong Kong, Hong Kong, China

Email: henry.han.career@foxmail.com

Abstract. With the development of global economic integration, the financial markets of many countries have developed rapidly, and many financial markets have become more and more mature in the world. At the same time, financial derivatives have also experienced nearly half a century of development and application. However, after the outbreak of the subprime mortgage crisis in the United States in 2008, the negative role of financial derivatives was pushed to the forefront of public opinion. The same thing happened in China's financial markets in 2015. What role did financial derivatives play in the stability of China's financial market? Based on this, the article will look for conclusions by observing the transaction data of China's financial market from 2010 to 2021, through the functional analysis of financial derivatives, and the actual supervision of China's financial market.

Keywords: Financial Derivatives, Economic Cycle, Financial Crisis, Market Supervision

1 Introduction

The development of financial derivatives market in the international mature financial market has a history of nearly a century. The development of China's financial market started relatively late. After the failure of the derivatives market in the late 1990s, it began to gradually go on the right track at the beginning of this century, but it is still not mature enough. There are many types of derivatives in the current financial market, but most investors do derivatives business for the purpose of arbitrage or speculation, such as leveraged arbitrage in OTC Options Trading. This kind of behavior may produce certain profit benefits in the short term, or it can stimulate the market economy in a certain economic stage. In the long term, whether the existence of financial derivatives business can play a positive role in the stable development of China's financial market is a topic worthy of study.

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2 Literature review

Since the establishment of the Shanghai and Shenzhen Stock Exchanges in the early 1990s, the financial derivatives business in China's financial market has existed, but it has always been in the stage of exploration and rectification. After the establishment of the China Financial Futures Exchange (CFFEX) in 2006 and the release of the "Regulations on the Administration of Futures Trading" in 2007, the financial derivatives market really began to run and develop.

Wang, Jingjing (2011) pointed out that the main functions of financial derivatives on the financial market include risk transfer, price discovery, pricing function, speculative arbitrage and resource allocation [2]. However, with the very rapid development of the derivatives market, the supervision cannot timely and effectively restrict derivatives transactions, resulting in a lot of risks such as market risk, credit risk, liquidity risk, operational risk, transaction risk or legal risk. The role of financial derivatives on financial markets is highly controversial. Some positive views believe that, the example for Wang, Shi (2006), financial derivatives have positive effects such as efficient risk management, balancing market prices, stabilizing spot prices, and promoting innovation in inter-bank market business [3]. However, some contrarian views believe that, taking Cheng, Jiaqian (2022) as an example, the increase in the level of derivatives leads to the concentration of risks and the increase of leverage leads to amplifying risks, which will have many chain risk effects [1]. In addition to the research on the function and risk of derivatives, the predecessors also conducted research on the microscopic field. Xie, Zhenggan (2021) pointed out in the article " Research on the Impact of Financial Derivatives Transactions on Commercial Banks' Risk-taking" that financial derivatives increase the pre-loan and post-loan risks of commercial banks [4]. Zhou, Ying (2015) points out that the method of financial derivatives regulatory reform can improve the transparency of over-the-counter (OTC) derivatives, strengthen investor protection and strengthen international regulatory cooperation [5].

At present, most of the research on the impact of derivatives business on the financial market is aimed at specific industries or businesses such as commercial banks, risk management of listed companies, risks and functions of derivatives, or OTC derivatives products. However, research in the macro field is insufficient, such as whether financial derivatives trading is conducive to the stability of financial market development in the long term.

3 Research methods

This article will use the data comparison method and functional analysis method to study the relationship between derivatives trading and financial market stability. First of all, this article will describe the functions and risks of financial derivatives, and then find out whether there is a correlation at the macro level by comparing the derivatives transaction data and market stability data in the Chinese market in the past 10 years. Next, by analyzing the different roles of financial derivatives in different stages of the economic cycle, we can judge whether financial derivatives play a positive role in the

overall long-term economic cycle. In addition, this article will analyze the development in the financial market from the perspective of financial derivatives supervision. Finally, the article will get the conclusion based on data comparison, theoretical analysis and the actual situation of the China's financial market.

3.1 The Function of Financial Derivatives

The first is hedging that is also one of the most basic functions of financial derivatives. The hedging is to lock the cost price of the transaction by signing a contract in advance, so as to transfer the risk of the price increase or decrease of the transaction object to the counterparty of the transaction contract.

Second is the price discovery function. The derivatives trading market has concentrated a large number of transaction entities with different needs, thereby improving the transparency of transaction asset information and forming a relatively real price system.

In addition, financial derivatives also have the function of speculative arbitrage. In the process of derivatives trading, the purpose of most investors is speculation and arbitrage. In order to achieve the purpose, investors immediately resell the financial derivative products after the transaction, once they find the space for a premium.

3.2 Risks of Financial Derivatives

The first is systemic risk. Systemic risk is closely related to the overall economic, political and social environment of the financial market. No matter what happens, the risk will be transferred rather than go away. The use of multi-level financial derivatives will lead to a relative concentration of risk that were originally scattered in the market. Too much risk transfer leads to a backlog of risk that will explode at some point.

The second is market risk. The market risks of different types of financial derivatives are different. The market risk of Options financial derivatives is mostly borne by the seller of the contract, while the market risk of Futures and Swap financial derivatives is likely to be borne by both buyers and sellers. However, not all types of financial derivatives carry market risk. The function of Forward financial derivatives is to avoid risks caused by price fluctuations, so there is no market risk in Forward financial derivatives.

In addition, financial derivatives have liquidity risks. Liquidity risk is due to the sharp drop in the trading volume of the stock market, resulting in the inability of derivatives traders to close their positions within the specified time. This risk often exists in the OTC derivatives market. The reasons for the lower liquidity risk of on-exchange derivatives are due to the large transaction scale, the high standardization of the transaction process and the high transparency of transaction information.

Finally, there are operational and credit risks due to management flaws and human factors.

3.3 Data Research

This section selects the annual turnover of financial derivatives transactions and the weekly rise and fall of the CSI Smallcap 300 (CSI 300) index in China's financial market from 2010 to 2021, a total of 625 data, as the experimental data for this study. After analyzing the market stability of the CSI 300, the financial derivatives turnover data were compared with market stability data to obtain preliminary observations.

3.3.1 Meaning of Data Selection.

The CSI Smallcap 300 index (CSI 300) selects the 300 securities with the largest turnover and the largest total market capitalization in China's financial market, which are mainly distributed in leading companies in various industries in China's financial market, and reflect the trend of large-cap stocks in China's financial market.

According to database statistics, as of August 2022, the total market value of CSI 300 is 46, 234.9 billion yuan, accounting for 57% of the total market value of China's A shares of 81,162.6 billion yuan. Therefore, the stability of the CSI 300 Index can dominate the Chinese financial market.

3.3.2 Experimental Process.

In this experiment, the experimental data were divided into two groups. One group is the annual turnover of financial derivatives from 2010 to 2021 (Data Source: CFFEX Annual Report), and the other group is the CSI 300 weekly change data from 2010 to 2021 (Data Source: Choice Database of East Money Information Co., Ltd.). First, the experiment conducts ANOVA in single factor on the data of CSI 300. In the experiment, the dispersion degree of the three index data was analyzed by analysis of variance, and the market stability results corresponding to the CSI 300 were as follows:

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
2010	51	-10.581914	-0.2074885	11.0649511
2011	51	-27.019249	-0.5297892	6.78393905
2012	50	7.51721072	0.15034421	7.98052775
2013	51	-5.3277717	-0.1044661	8.17245053
2014	53	45.0014562	0.84908408	8.08255966
2015	52	11.6599305	0.22422943	23.7903175
2016	50	-10.03629	-0.2007258	7.67014322
2017	51	20.153503	0.39516672	1.66732707
2018	51	-26.687336	-0.5232811	9.4349592
2019	51	30.6181337	0.60035556	6.31842997
2020	52	28.2136767	0.5425707	8.80776637
2021	52	-3.6691021	-0.0705597	6.501611

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	111.090561	11	10.0991419	1.13756199	0.32886086	1.8045234
Within Groups	5353.36326	603	8.87788269			
Total	5464.45382	614				

Fig. 1. ANOVA Single Factor of CSI 300 (Photo credit: Original)

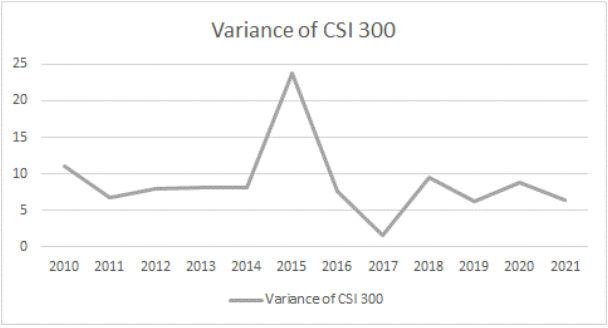

Fig. 2. Variance of CSI 300 (Photo credit: Original)

A higher numerical result of variance means worse stability, whereas a lower numerical result means better stability. According to the trend of the data, the past 11 years can be divided into 3 parts, namely 2010-2014, 2014-2016 and 2016-2021. Since 2011, the volatility of the CSI 300 market has maintained a small increase. Between 2014 and 2016, the stability of the market has experienced huge fluctuations. During the period from 2016 to 2021, the market volatility of CSI 300 fluctuated within a reasonable range.

Next, the experiment will display the data of the total annual trading volume of derivatives in China's financial market from 2010 to 2021 and draw it into a line chart to facilitate the observation of its growth trend. Then, the financial derivatives transaction data and the CIS 300 stability data are compared and analyzed.

Years	Turnover of Financial Derivatives (100 million CNY)
2010	410698.77
2011	437658.55
2012	758406.78
2013	1410066.21
2014	1640169.73
2015	4177604.71
2016	182191.1
2017	245922.02
2018	261222.97
2019	696210.07
2020	1154350.96
2021	1181651.64

Fig. 3. Turnover of Financial Derivatives in 2010-2021(Photo credit: Original)

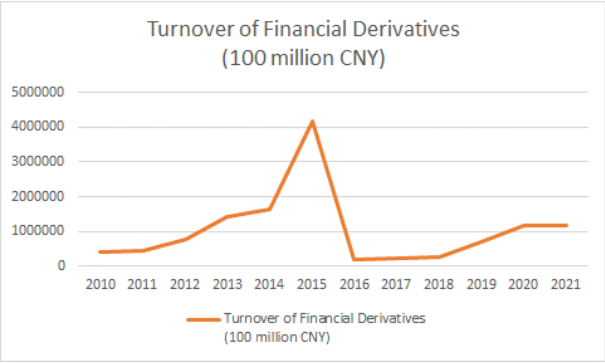

Fig. 4. Line Chart of Table 2 (Photo credit: Original)

Through the observation of financial derivatives transaction data, the data can also be divided into three parts, namely 2010-2014, 2014-2016 and 2016-2021. Since 2010, the trading of derivatives in China's financial market has gradually increased. The 2014 surge in market derivatives trading continued into 2015, followed by a sudden drop to near zero in 2016. From 2016 to 2018, the trading of financial derivatives has remained very small in these two years. It resumed a steady upward trend from 2018 to 2021.

3.3.3 The Result of Observation.

The experiment now compares financial derivatives transaction data with CSI 300 stability data. From 2010 to 2011, financial derivatives transactions did not increase significantly, and the CSI 300 market also stabilized at this time. From 2011 to 2014, the trading volume of derivatives gradually increased, and the volatility of the CSI 300 increased at this time. In 2016, the trading volume of derivatives suddenly dropped, and the volatility of the CSI 300 market at this time became very stable. However, this pattern has changed after 2016. In general, during the period from 2017 to 2021, the trading volume of financial derivatives has gradually increased, while the stability of the financial market has maintained a small fluctuation and an overall downward trend.

To sum up, according to the experimental data observed in 2010-2015, when the trading volume of financial derivatives increases, the overall stability of the financial market is poor. Conversely, when the trading volume of financial derivatives decreases, the financial market tends to stabilize. However, this result does not apply to China's financial markets after 2016. After 2016, the scale of derivatives trading has grown steadily, but the market has continued to fluctuate slightly and has generally shown a stable trend. According to the fundamental nature of most financial derivatives with hedging, the financial market after 2016 seems to be more logical, while the market before 2016 is more abnormal. The specific reasons still need to be explored according to the actual market conditions. Therefore, this article will continue to study the role and supervision of derivatives in various stages of the economic cycle, and draw final conclusions based on the actual market conditions and the experimental data.

3.4 The Role of Financial Derivatives in Various Stages of the Economic Cycle

3.4.1 Expansion Stage.

During the stage of economic expansion, financial markets develop rapidly. Financial derivatives play a positive role. With the improvement of investors' enthusiasm for investment, financial derivatives can help the market to raise funds, improve the efficiency of resource allocation and form productivity. For example, according to the trading rules of index futures, whether the index rises or falls, investors will still have the opportunity to make profits, because investors can use derivatives to short. In this way, a large number of idle funds outside the market are brought into the market to help the market raise funds to develop the financial market. The development of the financial market has also improved the efficiency of resource allocation. Therefore, some originally non-productive capital has been transformed into productive capital. At this stage, financial derivatives are helpful to the development of the real industry.

3.4.2 Peak Stage.

Financial derivatives play a role in risk accumulation in this stage. When the market economy reaches its peak, the speed of financial market development will slow down, which is the beginning of a recession. Investors prefer to invest in financial derivatives as a hedging tool to hedge the risks that may arise in the financial market at any time. Due to the leverage of financial derivatives, investors will choose to invest in derivatives with leverage in order to better achieve hedging effects or speculative profits when trading financial derivatives. Therefore, at this stage, the trading scale of derivatives in the financial market will increase, but in this case, the stability of the market will decrease as the hedging effect of derivatives becomes ineffective due to the continuously exposed risks. However, market supervision at this stage is relatively lax, and there are many multi-layered nested financial derivatives in the market. This will magnify and centralize risk. Therefore, once the risk erupts, it is likely to trigger the next stage of financial crisis.

3.4.3 Contraction Stage.

Economic contraction phases are often accompanied by larger financial market declines. If the situation is serious, it may lead to a larger-scale financial crisis. At this stage, the positive effect of financial derivatives may be invalidated, and the negative effect on the financial market will be revealed. In the subprime mortgage crisis in the US financial market in 2008, financial derivatives played a role in risk dissemination and risk amplification.

First, is risk dissemination. Before the subprime mortgage crisis broke out, many subprime mortgage derivatives were packaged as CDOs or CDSs by Wall Street financial institutions. Over time, thousands of sub-prime derivatives were nested in layers. However, asset risk has not disappeared but has been transferred. As a result, investors cannot identify product risks and blindly pursue Wall Street's "AAA" high credit rating products.

Secondly is risk amplification. Data show that the average leverage of financial institutions' derivatives business was 35 times when the US subprime mortgage crisis broke out in 2008, which led to the magnification of the subprime mortgage crisis.

After the outbreak of the financial crisis, the US government made reform adjustments to financial supervision. In 2010, then U.S. President Barack Obama signed the Dodd-Frank Wall Street Reform and Consumer Protection Act, which has been called the most comprehensive and far-reaching financial supervision reform act since the Great Depression of the 1930s.

3.4.4 Trough Stage.

The economic trough stage means that the decline in financial markets starts to slow down and begins to turn into an economic recovery. Due to the tightening of policies by the financial supervision department during the period of economic contraction stage, the trading of financial derivatives will return to the basic role of risk hedging. In contrast, relatively loose policies at other stages enabled the application of more innovative derivatives. While the derivatives market is more active, it also creates opportunities for speculative transactions, which leads to the accumulation of risks and the risk of market instability.

Combined with the post-economic contraction and economic trough analysis, the supervision of the derivatives market and financial policy seem to be an important factor affecting the stability of financial markets. Therefore, the following will analyze the changes in the supervision of China's financial market after 2016.

3.5 Supervision of Financial Derivatives

Based on historical closing points, the CSI 300 suddenly increased by 113% between November 2014 and June 2015, and fell precipitously by 47% by February 2016. This period has been called the "2015–2016 Chinese stock market turbulence" by industry insiders. Before 2015, due to regulatory flaws, there were many factors that were not conducive to the development of the financial derivatives market, such as illegal fund matching, ultra-high leverage, and multi-layer nesting of derivative products. The stock market turbulence has exposed many problems, such as defects in the market and trading system, and loopholes in supervision. Therefore, similar to the U.S. in 2010, China's financial supervision department also released many new supervision policies and measures in 2016.

In the nearly one year since February 2016, the China Securities Regulatory Commission and the China Fund Industry Association have jointly established a "7+2" self-discipline system to improve the supervision of the financial industry. The "7+2" self-discipline system includes 7 management measures, guidelines for internal control and guidelines for fund contracts. Among them, there are two reform policies that have a very significant impact on the supervision of the financial derivatives market. One is the “Regulations on Filing Management” promulgated in July 2016, and the other is the “Interim Regulations on the Operation and Management of Private Equity Asset Management Business of Securities and Futures Institutions” promulgated in October

2016. These policies has tightened the fund channel business, standardized the trading system of the financial derivatives market, and strictly controlled the leverage and product nesting of derivatives.

4 Conclusion

From a macro perspective, the main role of financial derivatives is to hedge risks. Logically speaking, risk hedging can increase the stability of financial markets. However, according to the observation of the data from 2010-2021, only the data from 2016-2021 is in line with this logic, while the data from 2010-2015 is the opposite. Through the analysis of derivatives market supervision, the financial market supervision measures after 2016 are relatively complete, while the derivatives market lacks supervision before 2015. Therefore, we can explain this phenomenon and draw conclusions. When the financial derivatives market lacks effective supervision, financial derivatives will be reduced to a tool for investors to do speculative transactions. Financial market risks are transmitted and amplified, and at the same time, the market is very unstable. When the financial derivatives market has a effective supervision, financial derivatives will play a role in risk hedging and make the market more stable.

China's financial markets still have a long way to go. Compared with some mature markets in the world, such as Nasdaq, Dow Jones, etc., the stability of China's financial market is not good enough. Financial supervision is one of the key factors in ensuring financial market stability, because it can reduce systemic risks and maintain market order. Reform helps development and supervision helps stability.

References

1. Cheng, J. Q. (2022) Systematic Financial Risk Analysis Based on Financial Derivatives. Shanghai Business, 2022, (02), 80-81.
2. Wang, J. J. (2011) Study on Regulation of Derivatives Financial Instruments in China. https://kns.cnki.net/kcms/
3. Wang, S. (2006) The Research on Financial Derivatives and Practice of Futures Market in China. https://kns.cnki.net/kcms/
4. Xie, Z. G. (2021) Research on the Impact of Financial Derivatives Transactions on Commercial Banks' Risk-taking. https://kns.cnki.net/kcms/
5. Zhou, Y. (2015) New Developments in Financial Derivatives Supervision in the Post-Crisis Era. Brand, 2015.8 Part I, DOI: https://doi.org/10.19373/j.cnki.14-1384/f.2015.08.144

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