

Development of China's Derivatives Market: a Review of Studies

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Abstract. Under the background of globalization and financial innovation, the derivative markets in China have excellent growth potential as China is accelerating its transition towards a market economy, making it a valuable object for studies in financial derivatives. However, the market is still in its infancy. Relevant research focusing on China's derivative market is relatively scarce and fragmented compared to those focusing on the developed economy. This paper intends to encourage more scholars to examine the Chinese derivative market and its characteristics by offering a review of the studies on China's derivative markets, providing forward-looking opinions and direction of future research. The conclusion is as follows: (1) More research focusing on the period of crisis-like event needs to be done since they provide a basis to test the stability of China's derivative markets; (2) the impact of derivative regulation in China should be carefully considered as the opinion of current research remain divided on this subject; (3) Future research should also focus on comparative analysis of market traits and linkage between China and other developed economies since the Chinese mainland market is adjusting to conform the international standard.

Keywords: derivative; China; financial markets; finance.

1. Introduction

Since China joined the WTO in 2001, the development of an internationalized market and the transition towards a market economy have both been pushed further and further each year. As globalization proceeds, China, being a part of the emerging market, faces significant challenges from the competition with the developed economy. In this process, corporations in China become increasingly attentive to the various exposures they are facing. The unresolved problems of risk in foreign exchange, interest rate, and commodity price volatility will create demands for the financial market to provide a mechanism of hedging and price discovery. This unique situation, as a direct result of the short time span of China's financial market, makes the derivative markets in China a valuable ground for research and study.

The research regarding financial instruments and derivative markets tends to concentrate on the developed economy since they undergo more reform and have documented data over a long period. Studies using the Chinese derivative markets as the focus are scattered with their unique perspective. The primary purpose of this paper is to consolidate the previous studies with an overview of the development in the research area regarding the Chinese derivative market to provide suggestions on the direction of future studies. This paper divides the topic based on the classic classification of the derivative. The first part focuses on the studies regarding standardized derivative products. Attention is paid to China's market dynamics, including volatility and price linkage, and the integration with the international markets. The second part concentrates on the over-the-counter (OTC) derivative markets in China, with an emphasis on the development and traits of market policy and regulation.

2. Standardized products in China

2.1 Background of Standardized Derivative Products

A standardized derivative product describes a financial instrument derivative that is publicly traded on an exchange. The underlying asset and the corresponding exchange determine the intrinsic value

of such a product. The traded amount, expiry, and strike price of such derivative contracts are standardized by the exchange.

Standardized derivatives have several characteristics. Firstly, the market information is transparent as the derivative is traded publicly. This transparency reduces asymmetric information between the market participants, contributing to the reduction in market risk. Secondly, the market participants are mainly exposed to market risk. The credit and liquidity risks are reduced since the exchange manages the clearing and delivery, and the market participant pool is large. The publicity of standardized products is critical since it provides the researchers with complete and abundant data to analyze, building a foundation for the following comparative analysis across international markets and studies of traits within the domestic market.

2.2 The international link in the Chinese futures market

As China takes more market proportion in international trades, the pricing dynamics across markets become increasingly important to study due to this market composition change. Jia et al. explore the linkages of return and volatility between Chinese and U.S. markets on agricultural futures—soybean, corn, and wheat [1]. The research shows that the lead-lag relationships are dependent on regulatory policy and economic periods. Specifically, goods that are relatively less regulated by the Chinese government, soybean, for example, tend to be influenced more by the U.S. markets on their returns. The markets of heavily regulated commodities, such as corn and wheat, led the U.S. markets in the sampling period. On the volatility side, there is a consistent lead from the U.S. market. Li and Hayes touch on the same point with a different scope focusing on the soybean market between Brazil, United States, and China [2]. Their findings demonstrate that the United States continues to be the market with the greatest influence on soybean pricing. However, this situation begins to change as developments in other economies, such as China, proceed. The long-run causality of price between the U.S. and other economies is weakened, and the opposite causality begins to appear in the soybean market. Yang and Zhou investigate the correlation between the Shanghai International Energy Exchange (INE) in China and three other significant exchanges in terms of price fluctuations and return in the crude oil market [3]. The study employed VECM-MGARCH models to examine the connections between the four markets and found long-term linkages in the volatility and price of crude oil between China's newly established exchanges and other developed markets. This linkage that the research identified is a part of the step for the Chinese oil futures markets to become a regional or global pricing reference. Li et al. performed a similar assessment of the Chinese oil futures market [4]. They used the GO-GARCH model and empirical analysis to examine the efficiency of hedging in this recently established market. The result shows that the price of futures and its underlying's price are consistent. Chinese oil futures market shows a higher correlation with OPEC or Oman futures market compared to other markets, indicating that the market has the traits of a mature futures market.

2.3 The relationships and dynamics between China's spot and futures markets

Besides international market relations, China's spot-futures linkage is another hot area for discussion. Ping et al. conducted research on the connections and price link within oil markets and energy stock markets in China using the dynamic condition correlation (DCC) multivariate GARCH model [5]. Through a comparative analysis of the market relations using the markets in the United States, the research showed that the correlation of the three markets is relatively weak compared to those in the U.S. due to tight price control policy. The research also observed a bilateral volatility spillover effect in the two market pairs only: the oil futures and spot pair and the oil spot and energy stock pair. Another important finding is the shift in market correlation after the financial crisis. The result suggested that correlations were stronger before the crisis. Chen and Tongurai further explored the Chinese domestic market relationship under crisis-like events such as trade disputes between U.S. and China and accounted for the reasons why the correlations would change [6]. Their investigation on the spot-futures market connection in China during the trade war confirmed that there was a

noticeably higher future-spot correlation in the stock index, metals, and commodities markets during this conflict. This is a result of the strongly connected fundamentals of the future-spot market based on the uniform negative view on the trade dispute from the market participant. This connection was weakened by the deviation in the market view after the dispute showed signs of relief. The futures market sends price signals to the spot market because it integrates the market's anticipation of shock during the disagreement more thoroughly. Using China's stock index futures as a sample, Xie and Huang employed GARCH models to study the changes in volatility that the futures market induced [7]. According to their findings, the establishment of the futures market did not significantly affect how volatile the spot market was. Instead, the futures has an effect on how responsive the spot market is to information. Specifically, with the incorporation of the futures market, the spot price is less responsive to newly produced market information while becoming more sensitive to historical information, which is contrary to common expectations. Using an enhanced thermal optimal path method, Wang et al. examined the connection between the index spot and futures pricing for the CSI index [8]. Both daily and one-minute high-frequency results are used in the research. On the basis of daily data, they conclude that the price-leading interaction between the two markets is unstable, but evidence from one-minute dataset suggests that the futures market drives the spot price.

2.4 The volatility and pricing of the Chinese index options market

Given that it only recently debuted in 2015, the Chinese stock index options market is still in its infancy. Researchers touching on this topic are primarily interested in the basic properties of the market and whether this newly-formed market could qualify its role as a proper hedging tool. Yue et al. discovered a discrepancy between the real price of the options and their derived Black-Scholes price [9]. Their findings on the existence of a non-zero delta hedged gain suggested that trading decisions also include other volatility risk factors instead of basing only on underlying risk. Li et al. also identified this non-zero delta hedged gain and further indicated a negative risk premium from their regression analysis on the hedged gain [10]. The discrepancy from standard option pricing (e.g., B-S model) in the Chinese market also encourages researchers to explore other metrics to value an option. By constructing an implied volatility spread based on liquidity ranks, strike prices, and expiration dates, Li et al. evaluate the relative values of the options [11]. Their result showed a consistent relationship between the underlying stock returns and options price. Positive historical returns will drive up the price of call options, while negative returns elevate the price of put options, regardless of the option's liquidity. Adding to the investigation into the connection between underlying and option pricing, Arkorful et al. looked at how the option market's emergence affected the price fluctuation in the spot market [12]. Their results concluded that there was a consistent reduction in volatility in SSE 50 ETF spot market after the options market was introduced. Their findings also suggest that the behavior of the market participant, whether they decide to hedge or speculate, also impacts market volatility.

3. Over-the-counter (OTC) products in China

3.1 Background of OTC Derivative

The main purpose of the OTC market is to satisfy the need to hedge the risk or to avoid the burden, such as capital requirement, incurred by financial regulation. Over-the-counter (OTC) products are traded in private transactions, in contrast to standardized products, which are openly traded. The market participants receive one-to-one communication and tailored solutions to their needs.

The benefits and drawbacks of OTC products are as follows. On the beneficial side, the deal of OTC products is highly flexible. The structure of the deal, including the underlying, tenor, volume, and price, can all be negotiated and customized. In extenuating circumstances, the deal can also be restructured before expiry. Secondly, the deal is information-secured. The information regarding the deal and its counterparties will not be publicly accessible. On the drawbacks side, the deal is highly risky. Both participants and market-maker are exposed to huge credit risk since the deal is executed

on a one-to-one basis. The deal could also face additional liquidity risk due to the relatively smaller market size compared to an exchange-based, standardized market. Additionally, the deal could suffer from market risk due to its high leverage.

Because of the above traits of the OTC product market, there is asymmetric information in the market. The market-maker naturally holds more market information than the participant, making such customized deals in OTC derivatives vulnerable to moral hazard. Considering the risk analyzed in the previous paragraph, the regulator plays a critical role in maintaining the stability of the market. This makes the studies in regulatory policy and its impact on the market necessary.

3.2 Regulatory policy development in the Chinese OTC derivative market

Several studies have pointed out that the power of derivative regulation and supervision is held by several agencies, and there are several power transitions within China's regulatory agency [13-15]. There are two subgroups of supervision that make up China's derivatives regulatory authority. The first group is governmental supervision, which seeks regulation from governmental agencies such as the China Banking Regulatory Commission (CBRC) and the central bank. The second group is self-supervision, in which the regulatory responsibility is given to the exchanges and industry associations.

During its development stages, China's over-the-counter market is also influenced by several legislative actions. One example is the implementation of the law that requires OTC trades to be documented to trade repositories [16]. Such legislative action is intended to improve market transparency and reduce systematic risk within the OTC derivative market in China. However, since the power to regulate the market is given to different agencies, the efficiency of these cautious legal actions is controversial. The proposal to construct a full-functioning trade repository has remained active in recent years. Zheng et al. give an overview of the development of trade repository regulation in China [17]. The formal trade repository in China only covers equity and commodities. For credit and foreign exchange, the functionality of the trade repository is not mature compared to developed economies. The study indicates that this developing process is held back by the "empty space" in China's legislation.

Some scholars find the conservative approach promising. Empirical analysis of a bank's risk preference concludes that the use of OTC derivatives contributes to risk-taking behavior [18-19]. The calls for more restrictive action to reduce risk assumed by financial institutions persist [20]. Others believe that the divided regulatory power would cause inefficiency. In a detailed evaluation of China's regulation of derivative markets, Fu et al. suggested that the current division in market regulation responsibility does not align with the transitive linkage of prices between different markets [21]. The lack of coordination between agencies serves as an obstacle in the process of financial innovation and cannot adapt to the complexity of the modern financial system in China. Zhang reviews the legislation regarding China's regulation of over-the-counter derivatives [22]. The study points out that there is inefficiency in realizing the regulatory objective due to the lack of a central agency and overlaps in the functions of current regulatory agencies. The study further indicates that there should be a centralized clearing system to effectively control the risk of those derivatives. Gao points out that China's OTC market regulation took a unique step towards internationalization, including localizing international derivative agreement norms [23]. However, the localized agreement contains a clause that is not universally recognized in China's court, suggesting that the OTC market regulation needs to be further resolved to integrate into international markets.

4. Conclusion

Research regarding standardized products confirms the following. First, the performance of the Chinese futures market suggests an increasing market power in the international futures market. Second, the Chinese derivative markets, in general, are still in a developmental stage. In futures markets, traits of a mature market begin to emerge. In the options market, however, trading behavior and market volatility suggest that more steps need to be taken before the market is fully matured. On

the bright side, empirical evidence shows that in markets of tightly regulated commodities, China can exert an influence on prices in the developed markets [1]. Its growing ability to influence price, volatility, and returns is primarily attributed to the shift in government policy under the "open-up" initiative and the increasing market share. Collectively, researchers indicate that the government should loosen its grip on the market. However, it is important to note that the relatively tighter regulatory policy does not cause the Chinese domestic market to deviate from the international markets [3-4]. Tighter control can stabilize the domestic price and prevent risk transmission from international markets. This forms a dissenting opinion to the traditional belief that control from the central government would impede the markets. Future studies should examine the effect of specific policies and conduct a comparative analysis of the markets before and after each promulgation and shift in regulation.

Researchers have found novel discoveries on the market correlation in the established markets in China during crisis events. However, there is a lack of research focusing on the crisis event and its impact on the newly developed derivative market, such as stock index options and crude oil futures. The COVID-19 pandemic is an important starting case for future studies due to the following reasons. First, the COVID-19 pandemic lasts long enough to examine the market performance. It is a crisis event that has complete development, residing, and recovery stages. Each stage has a different effect on the markets and their intra-national and international correlations. Second, China's monetary policy largely deviates from other countries. This provides various potential factors to analyze the consequences of the crisis-event on market correlations, as the derivative markets are highly sensitive to the change in monetary policy.

Research regarding the OTC market has the following implication. First, the market, similar to its standardized counterpart, is not mature yet. Market immaturity is expressed in the incomprehensive regulatory policy [13-16]. Second, the controversy on the degree of government regulation persists, which is consistent with the standardized counterpart. Some studies also found empirical evidence of the neutral effect of intensified regulation. Tata found that the increased regulatory burden did not exacerbate nor ameliorate the derivative market competition [24]. Such findings serve as a reminder that future studies concentrating on regulatory changes in the market remain necessary. One novel case study is the "Futures and Derivative Law" implemented in August 2022. This new law is the first formal legislation on the regulation of derivative markets with an emphasis on managing risk and increasing the cost of illegal activities in the derivative market. The impact this law has on the derivative market and the regulators' power division needs to be closely examined in the future.

Moreover, the current studies on Chinese market regulation have the following limitations. First, comparative analysis often uses the Western markets and Chinese mainland markets as case studies. However, it overlooked the Hong Kong market as a potential candidate for such analysis. Hong Kong's policy is under western influences yet is still relied on Beijing's central guidance. As a window for the "open-up" initiative and an experimental implementation of the famous "Two Systems, One Rule" principle, Hong Kong's regulatory policy would be a great case study to look into the future development of the mainland's OTC derivative market. Secondly, similar to the standardized products, there is a lack of research conducted on crisis-like event periods. During the COVID-19 pandemic, China has provided various relief packages and favorable monetary policy and fiscal policies to stimulate the market. As a key component in the market economy, OTC derivatives are directly affected by those policies. While the short-term impact on the market is clear, the long-term effect of the stimulating policy shift on the derivative needs to be further explored.

In summary, the development of the Chinese derivative market will be improved alongside technology and regulation. The former is currently being realized by electronic platforms and enhanced clearing schemes. The latter can be improved by eliminating the 'gray area' that existed in legislation. From the previous analysis, establishing a comprehensive system will be a key step in China's market growth and its internationalization into the global markets.

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