

國立政治大學應用經濟與社會發展

英語碩士學位學程

International Master's Program of Applied Economics  
and Social Development College of Social Sciences

National Chengchi University

碩士論文

Master's Thesis

中國股市熔斷機制對 CSI300 成份股的影響效果分析

On the impact of China's Circuit Breaker Mechanism

on the CSI300 constituent stocks

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Student：薛惠寧 Hui-Ning Hsueh

中華民國 108 年 06 月

June 2019

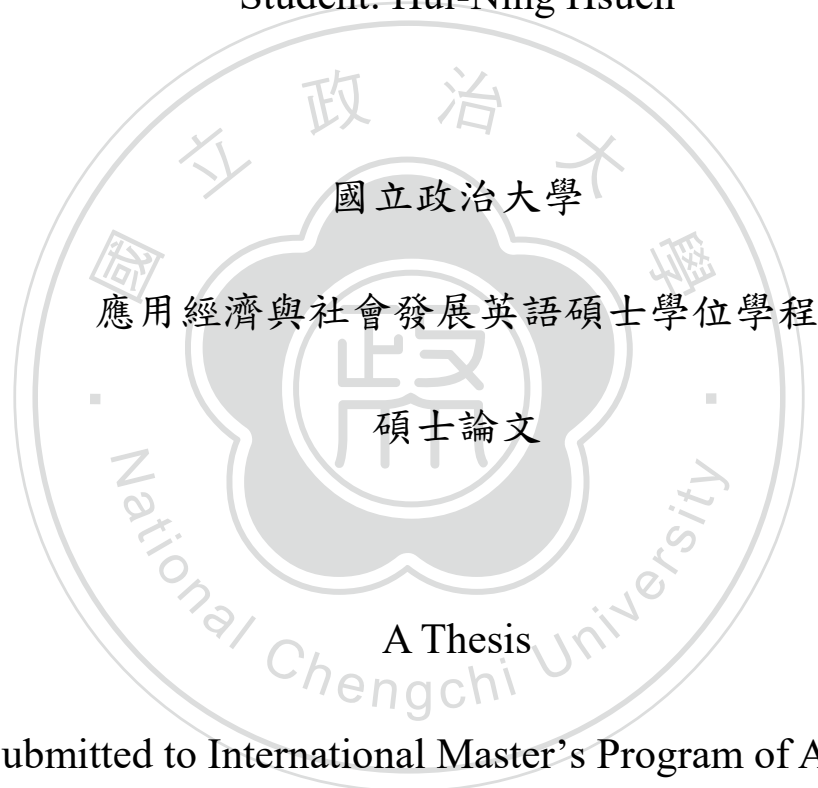
DOI:10.6814/NCCU201900491

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## Acknowledgments

My completion of this thesis would not have been possible without the guidance and help of Professor Shinn-Shyr Wang. I am very grateful to him for his support for my thesis. I thank my professor for devoting his significant time, energy, and patience during my final research.

Besides my advisor, I am very thankful to my thesis committee—Professor Shi Shu Peng and Professor Pao Chih Cheng—for their encouragement, insightful comments, and hard question. Their suggestions were very helpful, and the discussions have followed to further refine my paper.

Finally, I have to express my thanks to my family and my friends for supporting me spiritually throughout my life. During my two years at the Institute, I have cultivated a very substantial and solid ability, and because of their company, I have strongly enjoyed the past two years.

## Abstract

The circuit breaker mechanism is primarily used as a financial monitoring tool to prevent extreme price volatility. This study explores whether after implementing the circuit breaker mechanism, the relevant policy will become more effective or will generate market panic and thus affect liquidity. Econometric analyses are used to verify the long-term and short-term impacts of a circuit breaker. The empirical results show that the liquidity has indeed decreased, but it did not exacerbate the investor's selling behavior due to the policy implementation. Furthermore, the price drop is more severe in the short-term, while the trade volume decrease is more significant in the long-term.

**Keywords:** Circuit Breaker; China stock market; Market efficiency; CSI300 Index; trade volume

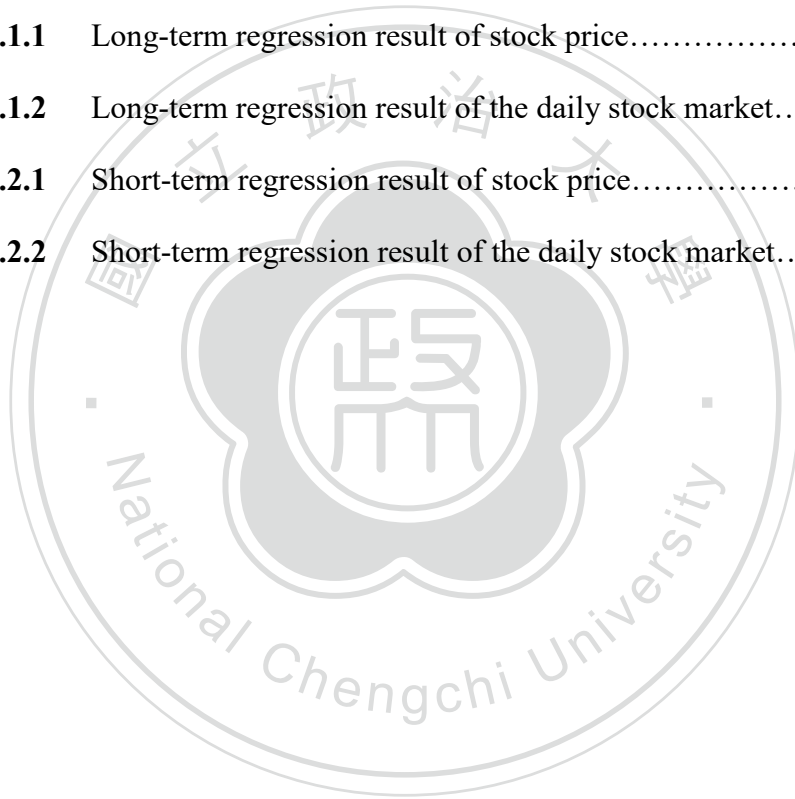


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# CHAPTER 1 INTRODUCTION

China's financial market has always been relatively closed compared to that of other countries. Therefore, we would like to explore whether China's relatively closed financial market will become more effective after implementing a new policy or whether a change will promote market panic and thus affect liquidity. This is the main motivation for our research. Firstly, we will introduce the main purpose of the circuit breaker mechanism and the spatiotemporal background. Chapter 1.2 will mention the innovations and deficiencies of the article, to facilitate the readers' understanding.

## 1.1 Research Background

The circuit breaker mechanism is primarily used as a financial monitoring tool to prevent extreme price volatility. When the index or stock price exceeds a set range, the mechanism will suspend trade for a period, or, alternatively, ensure that the price fluctuations fall within the specified range. The United States (US) regulatory authorities first proposed the circuit breaker mechanism in 1988. At that time, the market had just experienced a global stock market crash and needed a new system to ensure protection and stability. The name originated because the temporary trading suspension mechanism and fuse circuits are similar — both, are responsible for maintaining stability and reducing risk.

Before January 1, 2016, the Chinese stock market only implemented a price limit, which stipulated that the price could only rise or fall by 10%. However, the price limit system is only for individual stocks; it does not control the risk of the entire market index. Under the background of China's skyrocketing or sharply dropping stock prices, the market generally believes that the price limit system is not enough to help stabilize



the market, which may require additional price control measures. Therefore, in September 2015, China proposed specific regulations on the circuit breaker mechanism and solicited market opinions. In December 2015, the Shanghai Stock Exchange, Shenzhen Stock Exchange, and the China Financial Futures Exchange officially issued the provisions on the index circuit breaker mechanism: the fuse base was the China Securities Index 300 (CSI300) Index, and the second-level two-way refining was adopted. The trigger point is between five percent and seven percent, which is used to better prevent the risk of abnormal fluctuation in the securities market and to ensure the smooth operation of China's securities market. However, it also retains the 10% up and down limit of the existing stocks. Therefore, the Chinese securities market has officially included the circuit breaker mechanism since January 1, 2016.

On January 4, 2016, after the first day of implementing the circuit breaker mechanism, the CSI300 touched the 5% fuse trigger point at 1:12 p.m., and then, it suspended the trade for 15 minutes. When the trading resumed, the decline continued to expand, and after six minutes, the decline exceeded seven percent and triggered a circuit breaker. This caused the Shanghai and Shenzhen stock markets to suspend trading and close the market early. On January 7, at 9:42 a.m., the CSI300 Index fell 5.38% from the previous trading day's closing price, hitting the 5% break trigger point again. After 15 minutes, the transaction resumed. Within two minutes, the decline of CSI300 continued to expand—exceeding seven percent and triggering the fuse again. The stock exchange closed early on that day. The Chinese government implemented the circuit breaker mechanism to prevent abnormal market volatility and to avoid skyrocketing market prices. However, the actual situation that occurred in January 2016, during the four trading days under the mechanism in January 2016, indicated the mechanism's implementation did not achieve the expected results; instead, it exacerbated instability

in stock market trading. Therefore, the Chinese government has suspended the circuit breaker mechanism.

## **1.2 Innovations and deficiencies**

The first purpose of this paper is to analyze the stock price and liquidity difference between CSI300 constituents and non-component stocks, during the period in which the circuit breaker mechanism was implemented. After comparing the experimental group with the control group, we can specifically reflect on the change of explanatory variables. Next, the paper divides the data into two groups to clearly understand the short-term and long-term effects under the circuit breaker mechanism. However, there are also many deficiencies in this paper. For example, the sample selection is both limited and restricted because the circuit breaker mechanism officially launched in China over only two days. Moreover, because some stocks have incomplete transaction records, the sample statistics have lost some data as well.

In general, this paper studies the circuit breaker mechanism through a combination of theory and practice, analyzing the impact on the market from a theoretical perspective. Through the foundation of the previous, related literature reviews addressing the impact of the circuit breaker mechanism, the difference in differences model is used to compare and analyze the data indicators during the period that China implemented the circuit breaker mechanism.

The second chapter discuss the previous domestic and foreign literature on the circuit breaker mechanism, and the third chapter provides a complete introduction about the circuit breaker mechanism policy and CSI300. Then, the fourth chapter explains the statistical methods and the application of the difference in differences (DID) model. The fifth chapter includes the regression analysis. The statistical data is divided into a long-term group and a short-term group. After comparing the data with the past literature, we also compare it to our own views, which are integrated in Chapter 6.



## CHAPTER 2 Literature Review

The circuit breaker mechanism in China faced many positive and negative opinions before it was officially implemented. Although many countries have implemented the circuit breaker mechanism, it has always been largely controversial. Some viewpoints indicate that the circuit breaker mechanism can indeed achieve the effect of risk control in foreign securities markets. However, China's domestic stock market was still not strong enough, and even though the government implemented price limits, it was conservative in implementing the circuit breaker mechanism.

Subsequently, the circuit breaker mechanism triggered a stock market crash, continued to close the market early, and raised more doubts and questions about the full policy of this mechanism. This mechanism is mainly used to suppress the stock market's overheating of information transfer and to reduce the risk of fluctuation. Therefore, one must question why China could not smoothly implement it and whether it is worth performing research and discussing this topic. However, this paper refers to the literature on both China's and other countries' implementation of the circuit breaker mechanism. In addition, regarding the impact of the price limit system on the stock market, many scholars have conducted extensive research from different angles, first in terms of liquidity.

## **2.1 The influence of the price limit mechanism**

The price limit mechanism is an important factor affecting market liquidity. There are also positive and negative aspects of this impact. Proponents believe that it is reasonable to sacrifice liquidity by implementing the price limit mechanism. This helps the stock price to become more stable, which in turn reduces the risk of fluctuations. However, literature supporting the result that this mechanism improves market liquidity is relatively rare. For example, Guotai Junan Securities Co., Ltd. explored the relationship between microstructure and liquidity, illustrating that the price limits mechanism affects the liquidity in the market, which causes liquidity interference and overreaction. Opponents argue that price limit mechanism makes it difficult to achieve equilibrium prices, and investors cannot trade at willing prices. Corwin and Lipson analyzed the high-frequency trading data of the New York Stock Exchange, pointing out that the change would be very rapid when it suffered the pausing trading restrictions and the resumption of trading. It indicated that when the stock price was close to the price limit, investors were not inclined to believe in market trading, and the market liquidity would have reduced. The impatient investors would trade at unintended prices, but patient investors would wait for the price to reach equilibrium so the trade imbalance would correct itself.

### **2.1.1 Results of the price limits mechanism for different markets**

The price limits mechanisms for different countries were thoroughly analyzed. Most scholars believe that the upper limit will make the market obviously volatile, while the down limit will not be obvious. For example, Fan Liming (2008) conducted a market analysis of the time period when the price limit mechanism was implemented, and Qu Wenzhou (2008) conducted a study on the A shares of the Shenzhen Stock Exchange. Both researchers came to the same conclusions. Cho, Russell, Tiao, et al. (2003) also

used empirical tests to analyze the “magnet effect” in the Taiwan stock market and found that this effect was not completely symmetrical. The “magnet effect” means that when the stock rises sharply close to the price limit, there will be a clear acceleration to the limit, but no significant acceleration is observed when the stock price falls sharply. When the stock price is going to trigger the fuse threshold, some investors would fear liquidity loss and preemptively trade, the other investors would delay the transaction in order to wait for a better price. The market performance is the magnetic attraction that occurs close to the fuse limit, so it is called the magnet effect. Du and Liu (2006) also supported this view when analyzing the Korean stock market. From other perspectives, Huang, Fu, and Ke (2001) tested the hypothesis of by conducting statistical research on the stock prices in the Taiwanese market from 1990 to 1996 and asserted pointing out that there is an overreaction under the price mechanism, but this phenomenon can be quickly corrected in the later trading hours.

Berkamn and Lee (2002) also discovered that the change in the price limit was negatively correlated with stock volume and positively correlated with stock volatility. Therefore, smaller price limits can increase volume and reduce stock volatility, which is even more pronounced for small companies. Chinese scholars, Lu Jihong and Zhao Zhenquan (2000) also analyzed these two aspects and determined that although the price limit mechanism aggravated market fluctuations in the short term, it has a declining effect in the long run. In addition, they also found that the price limit mechanism significantly impacts companies with larger market capitalization, but it has less of an effect on companies with smaller market capitalization. Many methods and results on the price limit mechanism can be applied to the study of the impact on the circuit breaker mechanism in China. The research in this paper is also based on the two aspects of stock price fluctuation and liquidity.

## 2.2 The research of the circuit breaker mechanism

The circuit breaker mechanism has been widely adopted internationally, but scholars have continued to focus on the controversy. After the stock market crash in 1987, the Securities Committee (SEC) in the United States launched a "Brady Commission Report," where the concept of the circuit breaker mechanism was first introduced. Since 1988, the academic community has continued to debate whether the circuit breaker mechanism can positively affect the stock market. The report mainly considers the information transmission and market mechanism, and supporters believe that the circuit breaker mechanism can enhance the effectiveness of the market. When the stock market fluctuates greatly, the calm period can effectively prevent investors from behaving irrationally and can enhance the effectiveness of the stock market while reducing market volatility.

However, some scholars believe that the circuit breaker mechanism will not only have a stabilizing effect on the stock market but will also lead to the "magnet effect." After the launch of the "Brady Commission Report," Eugene Fama, the 2013 Nobel Laureate in economics, predicted that "investors will rush to complete the transaction before the trigger, resulting in the acceleration of the mechanism trigger." Similarly, Chicago scholar Lester Telser also believes that the circuit breaker mechanism will have an imbalance in the purchase order because "potential investors will tend to postpone trading for a better price when it is expected that some investors who are unable to maintain patience will sell or buy before triggering a fuse or a price limit." It is mainly based on price, but volatility and volume also support the delayed price discovery hypothesis, volatility spillover hypothesis, and trading interference hypothesis. Telser also supposes that the circuit breaker mechanism will hinder the market's normal price

point, increase market volatility, and hinder normal market transactions.

### **2.2.1 The literature from Europe and America**

The different scholars' research on the circuit breaker mechanism can be divided into two major directions: active and non-functional. The foreign research mainly focuses on the relationship between the circuit breaker mechanism and price fluctuation. French and Roll (1986) studied short-term price reversal and concluded that trading time will be more unstable than non-trading time, and they had supported the theory that implementing the circuit breaker mechanism would reduce stock market volatility. Yet, this conclusion is based on three assumptions: (1) there was more information on a trading day than a non-trading day to generate stock price fluctuations; (2) the insider information provided by informed traders causes most of the price fluctuations; (3) the irrational behavior of the trader will cause negative news to be reflected in the stock price. The third hypothesis above has a direct relationship with the circuit breaker mechanism and the price fluctuations. The first and second hypotheses only reflect the relationship between price fluctuations and message disclosure; they are not directly related to the circuit breaker mechanism. The empirical research of French and Roll explains why stock prices have greater volatility during the transaction, and it also supports the above hypotheses.

In addition, Gerety and Mulherin (1992) also proposed that fluctuations in the stock market under the circuit breaker mechanism are not only ineffective but may even exacerbate market instability. Through observing the changes in trading volume, they found that a large number of transactions occurred in the opening and closing stages because traders hoped to eliminate the overnight risk of holding stocks. Implementing



the circuit breaker mechanism will increase the uncertainty of the reverse transaction before suspending trading, prompting the trader to overreact to the market fluctuations and even leave the market. Therefore, the conclusion is that the circuit breaker mechanism will not only reduce the fluctuation of the stock market but also increase market volatility. Lee, Ready, Seguin (1994), Kavajecz and Goldstein (2000), and other scholars have published similar opinions.

### **2.2.2 The literature from China**

The research results of the circuit breaker mechanism in China's academia are scarce. Most of the literature pays more attention to the theory and experience of the circuit breaker mechanism in foreign markets. Song Zhenzhen (2017) used the extreme value theory to study the circuit breaker mechanism of the trigger level in the Chinese stock market index and found that the number that triggers the breaking in the falling direction is almost double that of the rising direction. It shows that the stock yield in CSI300 is asymmetrical between a crash and burn, and it is easier to touch the breakpoint in the down direction. Also, Hu Yuyue (2007) and other scholars have listed the relevant rules of the stock market in four countries and compared their implementation of the circuit breaker mechanism. Shi Xiaobo (2014) also reached a similar conclusion, agreeing that the circuit breaker mechanism can reduce market volatility and the risk of trading. There are also authoritative journals that have performed a regression analysis on international circuit breaker mechanisms. For example, the Financial Archives (2009, 2015) introduced the rules and circuit breaker mechanisms in some major developed countries and briefly discussed the debate in the academic circles.

However, the circuit breaker mechanism proceeded for only four days in China. There are two main defects in the circuit breaker mechanism design. First, the design of the two-pole threshold is too close, resulting in the magnet effect. For example, Hu Yuyue (2016) believes that implementing the circuit breaker mechanism will cause a trader to have the expectation of losing liquidity. The retail investors will assess the situation logically, but the collective irrationality strengthens the magnet effect and ultimately leads to the loss of liquidity in the market. On the other hand, the price limit mechanism of individual stocks and the index circuit breaker mechanism have led to a decline in liquidity. After implementing the circuit breaker mechanism, the range of intraday price was narrowed to seven percent in CSI300. Once the seven percent threshold was triggered, the market would stop trading on the day, causing the liquidity to decline.

According to the above conclusions, we determine that every country will always debate the effectiveness of the circuit breaker mechanism. It is rare to find empirical evidence about the circuit breaker mechanism in China's academic circles. Based on this, the paper analyzes the sample data during the price fluctuation to explore the impact of the circuit breaker mechanism in the Chinese market.

### **2.2.3 Review of research methods**

The test of the circuit breaker mechanism in the market is mainly divided into two different methods, which include empirical and experimental research. However, the circuit breaker mechanism has been rarely implemented. Therefore, in the case of less real data, the empirical analysis will be difficult and the results obtained will be very limited. The earliest research data was from 1987 when Lauterbrach and Ben-Zion (1993) conducted a similar study to conclude that the circuit breaker mechanism only reduced the imbalance of trading in the short term, but not in the long run. G.J. Santoni

and Tung Liu (1993) used daily data and intraday data to analyze the impact of the circuit breaker mechanism on price fluctuations. The final conclusions differed, and the daily data confirmed that the mechanism could not reduce price volatility. According to the past literature, there is still considerable discussion about the effectiveness of the circuit breaker mechanism among academics. One of the reasons is due to the different environments in which the circuit breaker mechanism was implemented. For example, different countries have different market maturities, and thus the mechanism will have different physiological effects and cause different conclusions. In addition, the limits due to the small scale, little data, short deadlines, and external validity of experimental conclusions make analysis difficult.

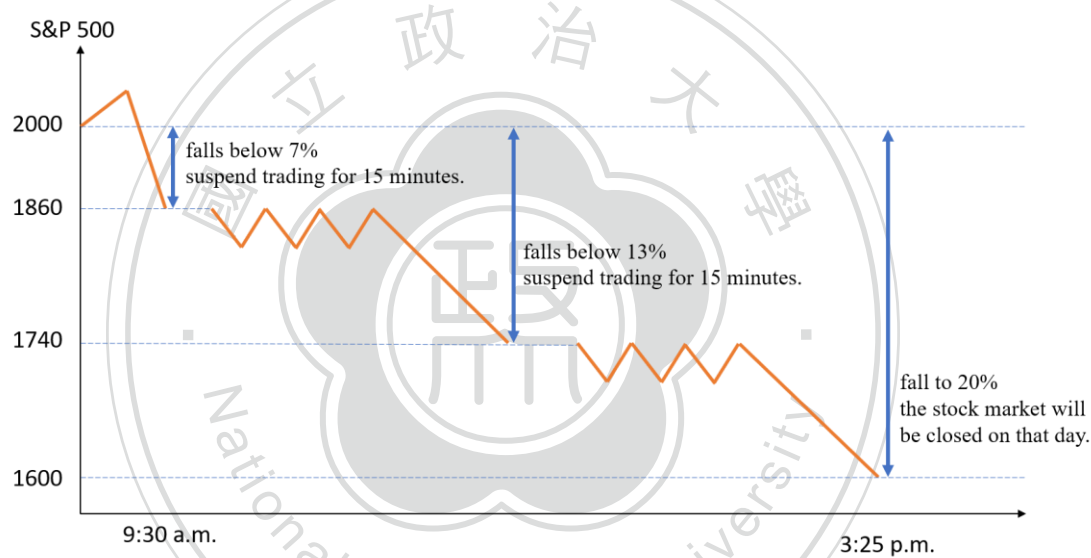
Studies in past literature have mentioned that price restrictions have had a major impact on companies with large market capitalization and have had less of an impact on companies with smaller market capitalization. Therefore, we also want to use statistical methods to determine whether the circuit breaker mechanism will have different effects on the different market values. The next section will detail the circuit breaker mechanism policy and CSI300.

## CHAPTER 3      Circuit Breaker and CSI300

The two main characteristics of China's circuit breaker mechanism are cross-market alliance and two-way insurance. In addition to the detailed introduction of China's circuit breaker mechanism, chapter three will also mention the background of different markets when policies are implemented and describe the composition of the CSI300.

### 3.1      The mechanism and its impact on market transaction

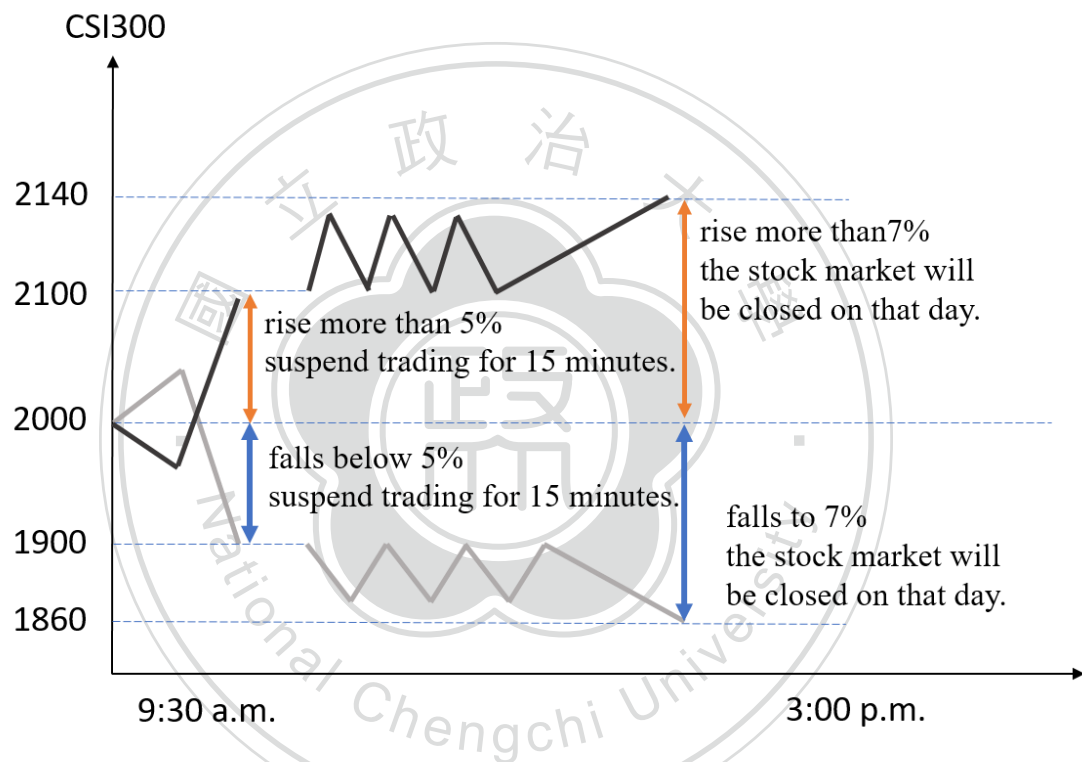
**Figure 3.1.1** The circuit breaker mechanism in the United States (US)



The circuit breaker mechanism in the United States (US) stock market is based on the S&P 500 index and is divided into three stages. The first stage starts from the previous day's closing price. When the S&P 500 falls below 7%, the stock market will suspend trading for 15 minutes. In the second stage, if the stock is still down, the trading will be suspended for 15 minutes when it falls to 13%. Both mechanisms aim to calm down the market. In the third stage, after transactions resume, if it continues to fall to 20%, the stock market will be closed on that day, and the transaction will also be terminated immediately. October 19, 1987, marked the first implementation of the circuit breaker mechanism. At that time, the United States was at a new stage of financial development.

New investment strategies were continuously introduced, derivatives transactions continued to advance, and the market was gradually trending toward internationalization. The circuit breaker mechanism aims to reduce the negative effects of these financial innovations, reducing information asymmetry and investor panic under extreme market conditions.

**Figure 3.1.2** The circuit breaker mechanism in China



In China, on December 4, 2015, with the agreement of the China Securities Regulatory Commission, the Shenzhen and Shanghai stock exchange and the China Financial Futures Exchange issued the “Related Regulations on Index Circuit Breaker,” which was officially implemented on January 1, 2016. On September 7, 2015, the Shenzhen and Shanghai stock exchanges and the China Financial Futures Exchange announced that they would introduce a circuit breaker mechanism base while retaining the price limit mechanism. The circuit breaker mechanism in the Chinese version uses CSI300 as the fuse benchmark index, setting a five percent and seven percent two-speed fuse,

both up and down. When the 5% fuse threshold was triggered, the trade would have been suspended for 15 minutes, then auctioned at the end of the fuse, and continued on the same day. However, the transaction would be suspended until the close of the market if the 5% fuse threshold was triggered after the 2:45 p.m. episode or the 7% fuse threshold was triggered at any time of the day. The "Related Regulations on Index Circuit Breaker" mainly focuses on the two aspects of cross-market conjunctions and the two-way fuse.

### **3.1.1 Cross-Market Conjunction**

The cross-market index is selected as the benchmark index of the circuit breaker mechanism because it is necessary to consider both the stock spot market and the futures market to more comprehensively measure the overall market volatility of A shares. However, there are only the CSI300 and CSI500 that are in line with the cross-market index. Because the stock market value and trading volume covered by the CSI300 are greater than that of the CSI500, it is considered that the CSI300 Index would be the better benchmark index for the circuit breaker mechanism.

### **3.1.2 Two-way fuse mechanism**

The "Related Regulations on Index Circuit Breaker" stipulates a two-way fuse mechanism, but it is expected that the rate of fall will be higher than the rate of a rise. Implementing the two-way fuse mechanism implies that the regulators hope to provide more time for consideration in the way of suspending transactions when the market is violent, thus reducing the investor's sentiment. However, other countries, such as in the United States, South Korea, and Thailand are implementing the circuit breaker mechanism for the decline because the essence of the circuit breaker mechanism aims to reduce the asymmetrical information caused by the sharp fluctuations and prevent

the “Herd Behavior,” which is relatively insignificant when stock prices rise. The biggest controversy of the circuit breaker mechanism is whether it is necessary to implement it under the price limit mechanism. In 2015, the stock index fluctuated significantly more than in the previous years. At this time, the Chinese government believed that the price limits mechanism was not enough to control the risks. It was necessary to add the control tools for the index.

## **3.2 Background to implement the fuse mechanism**

Section 3.2 will explain the background of China and the US at the time of implementing a circuit breaker mechanism. Both countries share the fact that their regulatory authorities decided to implement a circuit breaker mechanism because of a wave of stock market crashes. The biggest difference is that the US version of the fuse mechanism is divided into three levels: the first level drops by 7%; the second level drops to 13%; and the third level drops to 20%.

### **3.2.1 The circuit breaker mechanism in China**

This in-depth study of the slump causes also reviews the history of the stock market disaster in 2015 and the behavior of the government. There were two main reasons for the stock market crash in 2015. First, the panicked selling of leveraged funds in the stock market triggered mutual trampling and a domino effect. Second, the serious imbalance of the long-short in the A-share market has intensified market volatility. Before the beginning of June 2015, it was rare to see an A-share stock market crash. The Shanghai Composite Index fell from 5,178 points to 2,850 points in just two months, a drop up to 45%. To curb the irrational plunging and price-tracking behavior, the China Securities Regulatory Commission decided to implement the circuit breaker

mechanism to give investors sufficient time to calm down and disseminate information during this cooling-off period—expecting it could reduce uncertainty in price risk and information asymmetry and avoid investors' excessive reaction to suppress and alleviate the market.

### **3.2.2 The circuit breaker mechanism in America**

On October 19, 1987, the US stock market experienced the biggest crash in history. The Dow Jones index fell 508.32 points per day, a drop up to 22.6%. People called it "Black Monday." This fierce stock market crash shocked the entire financial world and triggered a "domino" effect in the global multi-regional stock market, which suffered a setback. In October 1988, the first anniversary of the 1987 stock market crash, the US Securities Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC) approved applications for the circuit breaker mechanism on the Chicago Mercantile Exchange (CME) and the New York Stock Exchange (NYSE). After that, the United States revised and improved the circuit breaker mechanism several times according to the changes in the situation. In 2012, the US changed the benchmark index from the Dow Jones index to the S&P 500 index. The current circuit breaker mechanism in the US is divided into three levels: the first level is a drop up to 7%; the second level is a drop up to 13%; and the third level is a drop up to 20%. For instance, if the first level (7% drop) threshold or the second level (13% drop) threshold is triggered between 9:30 a.m. and 3:25 p.m., the trade will be suspended for 15 minutes. However, if the third level (13% drop) threshold is triggered, the day trading will be suspended because the market closes in advance.

The fusing mechanism is mainly divided into two forms: “fused and breaking” and “fused and continuous.” Fused and breaking refers to the suspension of trading after the



price triggered the threshold. Fused and continuous means that when the price hits the first threshold, the trade can still continue for a subsequent period of time, but the quote must be limited to the blow threshold and the price volatility is limited.

### **3.3 CSI300**

Stock index futures can not only enrich the types of financial transactions but also improve the utilization rate of funds. In the meantime, it can also avoid the systemic risks of the market and ensure the stable operation of the macroeconomics. Therefore, it has become one of the most important and successful instruments in the financial market. The development of the stock index has deeply promoted the global financial market changes and improved market mechanisms. Along with the continuous development of the Chinese stock market, Shanghai and Shenzhen have formed two separate securities markets. Neither the Shanghai Composite Index nor the Shenzhen Component Index can fully reflect the trend of the entire A-share market. However, investors urgently need a unified index that can truly reflect the changes in the securities market as a direction for investment.

On April 8, 2005, the securities markets in Shanghai and Shenzhen officially released the CSI300 Index to the market, based on the 1000 points on December 31, 2004. As an indicator that can effectively reflect the market state, the CSI300 Index will gradually become the forward-looking indicator for investors. The select criterion was based on large-scale and highly liquid stocks. The average daily transaction of sample stocks was ranked from high to low in the most recent year by excluding the bottom 50% of the stocks, ranking the remaining stocks according to the daily average market value from

high to low, and selecting the top 300 stocks as sample stocks. In principle, the index constituents are adjusted semi-annually, generally in early January and early July, and the adjustment will not exceed 10%. Nevertheless, a company making lose money in the last financial report will not be selected to the new sample.

If the sample company withdraws from the stock market, it will be excluded from the index sample and replaced by another stock, which was the highest among the past candidate samples. In addition, the latest rules are adjusted that the newly issued stocks, which meet the sample conditions and whose total market capitalization ranks in the top 10, will be quickly selected to the index and enter the CSI300 after the end of the tenth trading day. Meanwhile, the ranking will exclude the stocks in the original sample list that ranked last in the most recent year.

The next chapter will analyze the statistical data from before and after implementing the circuit breaker mechanism; then, it will explain why we selected the DID model. The regression analysis is conducted through the DID model in Chapter 5.

## CHAPTER 4 Data and Methodology

Chapter 4 integrates and analyzes the data group. Also, it introduces the details of the DID model architecture and the regression formula. Through the analysis, it provides a better understanding of the regression results in Chapter 5.

### 4.1 Data

Tables 4.1.1, 4.1.2, and 4.1.3 explain the terms of regression data. This paper examines the key indicators of the circuit breaker mechanism as changes in stock prices and volume. Therefore, the intraday stock price index, the transaction amount, and the trading volume are selected. They were used to measure the effectiveness of the circuit breaker mechanism on the stock market, to encourage a more accurate and comprehensive analysis of the circuit breaker mechanism.

**Table 4.1.1** The control variables used in regression

Variable	Meaning	Definition
log_tas	Total assets	Log(Total assets)
lev	Leverage	Total debt /Total assets
prof	Profit	Net profit/Total assets
Gain	Earnings ratio	Stock price/EPS

Referring to the empirical method of the past literature, the following control variables were selected: total assets, leverage, profits, and earnings ratio.

**Table 4.1.2** The price variables used in regression

Variable	Meaning	Definition
Clsprc	Close price	Daily close price
Opnprc	Open price	Daily open price
Loprc	Lowest price	Daily lowest price
Hiprc	Highest price	Daily highest price

To determine the mechanism's effect on stock price, the close price, open price, lowest price, and highest price are selected as the outcome variables. The changes in the long-term analysis and short-term analysis are observed before and after implementing the circuit breaker mechanism.

**Table 4.1.3** The volume and value variables used in regression

Variable	Meaning	Definition
Dnshrtrd	Daily trading volume	
Dnvaltrd	Daily trading value	

In addition to the outcome variables of price, we also wanted to obtain the difference between the values for the long-term analysis and the short-term analysis of the daily volume and value of stock traded, we also selected daily trading volume and daily trading value as outcome variables.

Because the circuit breaker mechanism is based on the CSI300 Index, the constituent of the CSI300 Index is selected as the treatment group. Due to this treatment group selection, it is necessary to select the data of the approximate treatment group as the control group. We choose the relatively large capital in the Shanghai and Shenzhen stock market to be the control group. The control group will be selected from the top 300 listed companies in the Shanghai and Shenzhen stock market by eliminating the stocks in the treatment group.

**Table 4.1.4** The time period of the long-term and short-term groups

Long-term data		Short-term data
Pre	June 2015–December, 2015	November 20, 2015–December 3, 2015
Post	January 2016–March, 2016	January 4, 2016–January 7, 2016

When analyzing the stock price index in the session, we use long-term analysis and short-term analysis to measure the indicator across the two sets of data. The long-term analysis group selected the time range from June 1, 2015, to March 31, 2016, which is mainly due to the stock market disaster in China's A-share market since June 2015. At that time, the Shanghai Composite Index fell from 5,178 points to 2,850 points in only two months. Subsequently, the Chinese government announced in September 2015 that it intends to follow the foreign -recommended circuit breaker mechanism to stabilize the stock market. In January 2016, the follow-up resolution officially implemented the fuse mechanism. Therefore, the time period in the long-term group will not consider the time before the stock market crash in June 2015, but it will consider the long-term research scope for the three months after the stock market crash and the fuse mechanism.

The short-term data come from the 10 trading days before the China Financial Futures Exchange issued the “Related Regulations on Index Circuit Breaker” because it is speculated that its release psychologically affects the market. Therefore, as a sample for data analysis, the possible bias must be eliminated. The time point before December 4, 2015, was selected as the pre-period of the short-term analysis. Furthermore, the four trading days after implementing the mechanism were selected as the short-term observation group. Because the circuit breaker mechanism was removed four days after it was implemented, the amount of reference data is insufficient. Therefore, for the short-term group, we chose to use the data period that included the week before the mechanism as the control group.

**Table 4.1.5** Long-term statistics

Variable			Mean	Std. Dev
<b>Close price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.0278	10.6715
		<b>1</b>	15.8633	17.9088
<b>Open price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.1841	10.6727
		<b>1</b>	15.0570	17.9099
<b>Lowest price</b> (RMB)	<b>treatment</b>	<b>0</b>	12.6484	10.3344
		<b>1</b>	15.4683	17.5034
<b>Highest price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.5907	11.0144
		<b>1</b>	16.4628	18.3119
<b>Daily trading volume</b> (ten million)	<b>treatment</b>	<b>0</b>	4.3518	11.2112
		<b>1</b>	5.7981	13.9911
<b>Daily trading value</b> (ten million)	<b>treatment</b>	<b>0</b>	43.5517	91.7870
		<b>1</b>	67.7746	158.1817

Table 4.1.5 illustrates the statistics of outcome variables in the long-term analysis. The “time-dummy zero” value means the period before implementing the circuit breaker mechanism, while “time-dummy one” means the period after implementing mechanism. Also, the “treatment zero” indicates the control group, which does not implement the circuit breaker mechanism, and “treatment one” indicates the treatment group, which is implements the mechanism. When the circuit breaker was implemented, the daily trading volume of the components or non-components of CSI300 stocks fell by 50% and 40%, respectively. The stock prices also generally fell after implementing the circuit breaker mechanism. This showed that both the components and non-components of the CSI300 stocks were affected by the circuit breaker. The standard deviation in the post period is generally larger than in the per period, indicating that the fluctuations between the shares after the policy is relatively large after the policy.

**Table 4.1.6** Short-term statistics

Variable			Mean	Std. Dev
<b>Close price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.5546	10.5745
		<b>1</b>	16.1633	16.9277
<b>Open price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.6680	10.6633
		<b>1</b>	16.2924	16.9869
<b>Lowest price</b> (RMB)	<b>treatment</b>	<b>0</b>	13.1873	10.3221
		<b>1</b>	15.8067	16.6596
<b>Highest price</b> (RMB)	<b>treatment</b>	<b>0</b>	14.0089	10.9135
		<b>1</b>	16.6179	17.2120
<b>Daily trading volume</b> (ten million)	<b>treatment</b>	<b>0</b>	4.5206	6.3702
		<b>1</b>	5.1286	6.8834
<b>Daily trading value</b> (ten million)	<b>treatment</b>	<b>0</b>	44.2281	52.4700
		<b>1</b>	59.3232	69.2875

The statistics of the outcome variables in the short-term analysis are listed in table 4.1.6. Both the statistic in the long-term and short-term analysis achieved similar results. After implementing the circuit breaker mechanism, the mean of the stock prices and trading volume fell, and the mean of the stock price and trading volume in the experimental analysis were also higher than those of the control group. Further regression analysis is included in Chapter5.

## 4.2 Methodology

The statistical analysis method will choose to adopt the difference in differences (DID) model. When some interventions such as the implementation of the fuse mechanism cannot study the effectiveness through random assignment, DID is a method of pseudo-experimental design. By using the DID model, we can find a group of people who have not been affected by intervention to use as a control group and consider the group's trend as a benchmark to see if there is a significant difference in the trend of the intervention group. This benchmark is used to analyze data from two time points. The dynamic perspective can be used to present changes that occur after the implementation of the policy and to reduce or eliminate the impact of unobservable characteristics in the empirical results. As Smith and Todd (2015) explained, "by analyzing the policy effects of the time before and after the implementation, the effects of time-invariant unobservable characteristics are eliminated."

Most of the other matching methods in the common model are one-to-one matching or one-to-several matching. Moreover, most of the methods are based on the tendency to divide and find one or two control group samples closest to the treatment group samples as paired samples. According to their pairing design, an experimental group sample may find one or two similar control group samples, which are included in the paired sample, but do not control the distance between the treatment group and the control group. Therefore, this pairing is not very efficient in practical applications. The DID model also weights several paired samples within a certain range according to the tendency to divide, for use as a counterfactual sample and uses this process to provide information on the distance between the experimental group and the control group.



The concept of “interaction” looks at whether the trends in the two groups are different. We can construct the counterfactual trend in outcomes of the treatment group and in the absence of treatment using the trend in outcomes of the control group. Then, we can use the divergent trends in the outcome of treatment group to represent the causal effect of treatment. We are most concerned with whether the coefficients of the interaction term have reached statistically significant differences.

In the DID method, we can use the divergent trend in the outcome of the treatment group to represent the causal effect of treatment. Also, we can construct the counterfactual volatility of the circuit breaker mechanism in the control group and the treatment group.

The following regression equation (1) is constructed by the DID model:

$$Y_{it} = \mu + \beta\chi_i + \gamma D_i + \delta POST_t + \alpha (D_i \cdot POST_t) + \varepsilon_{s,t}. \quad (1)$$

Let  $Y_t$  denote the stock price, average trading volume, and market value after the policy exemption at time  $t$ .  $\beta\chi$  is a vector, representing a set of control variables in the model and expressed as  $\beta_1*\chi_{i1} + \beta_2*\chi_{i2} + \beta_3*\chi_{i3} \dots$ .  $D_i$  is a dummy variable indicating the treatment group (treatment).  $POST_t$  is a dummy variable indicating post-treatment period (timedummy).  $\gamma$  captures differences across groups that are constant over time.  $\delta$  captures differences over time that are common to all groups.  $\alpha$  is the coefficient of interest (the causal effect of treatment). If the analysis model does not control the  $D_i$ , there will be a large gap between the treatment group and control group.

## CHAPTER 5 Regression analysis

The Chapter 5 selects the price, the daily number and value of the stocks traded in as the outcome variables. Through the DID model, we got the regressions in the long-term and short-term analysis.

### 5.1 Long-term analysis

Tables 5.1.1 and 5.1.2 explain the coefficient of regression in the long-term group. The following tables analyze the price, volume and value of the stocks.

**Table 5.1.1** Long-term regression result of stock price

<b>Variables</b>	<b>Clsprc (Ltp1)</b>	<b>Opnprc ( Ltp 2)</b>	<b>Loprc ( Ltp 3)</b>	<b>Hiprc ( Ltp 4)</b>
<b>treatment</b>	0.3268*** (4.22)	0.3334*** (4.3)	0.3232*** (4.32)	0.3282*** (4.1)
<b>Time-dummy</b>	-2.2136*** (-7.54)	-1.859*** (-6.23)	-2.1136*** (-7.38)	-1.9406*** (-6.34)
<b>Inter</b>	-0.9873*** (-2.41)	-0.9307** (-2.23)	-0.9397** (-2.35)	-0.9889** (-2.31)
<b>log_tas</b>	-2.5565*** (-65.3)	-2.5554*** (-65.34)	-2.4806*** (-64.76)	-2.6376*** (-65.98)
<b>lev</b>	-1.2984*** (-5.15)	-1.3366*** (-5.29)	-1.3322*** (-5.46)	-1.2639*** (-4.86)
<b>prof</b>	29.325*** (21.5)	29.236*** (21.47)	28.049*** (21.07)	30.415*** (21.97)
<b>Gain</b>	14.316*** (57)	14.293*** (57.02)	14.103*** (57.15)	14.528*** (56.93)
<b>Constant</b>	34.289*** (118.52)	34.296*** (118.53)	33.247*** (117.83)	35.381*** (119.36)
<b>R-square</b>	0.4418	0.4605	0.4691	0.4544
<b>obs</b>	87696	87696	87696	87696

*Note.* The values in parentheses are t-value.

\*\*\* and \*\* indicate significant level under one percent and five percent, respectively.

The regression results of the stock price indicators in long-term trading are listed in Table 5.1.1. There are four models in the long-term analysis. In the table, the treatment coefficient in table 5.1.1 can be found to have significant regression results and the coefficients are all positive, meaning that the stock price in the treatment group is higher than the control group after considering the impacts from other variables. Then, notice that the time-dummy coefficient is negative in the long-term group, meaning that the price index in the post-period will be lower than that in the pre-period, including the close price, open price, lowest price, and highest price.

The interaction results of the stock price index in the long-term group all have significant regression results. When the inter value is negative it means that, after the circuit breaker mechanism, the treatment group will decrease in price index compared to the control group. There has been a significant effect on the treatment group. After the circuit breaker mechanism is implemented, while controlling other factors, the policy indeed reduces the day trading stock price of the A-share constituents, including the opening price, the closing price, the highest price, and the low price. In addition, the log (total assets), leverage, profit, and earnings ratio are used as control variables. In the long-term, a higher total assets and leverage will make the stock price fall; a higher rate of return and earnings ratio will make the stock price rise.

In conclusion, we can clearly find that the circuit breaker mechanism for CSI300 has indeed led to the day trading stock price index decline relative to the other A shares that have not implemented the policy. From the regression results, this mechanism may exacerbate the instability of the stock market. Referring to the research literature of Han Ao Shuang (2018), considering the empirical results that reveal the sell order was withdrawn, the implementation of the circuit breaker mechanism has aggravated the

degree of unbalance of the place orders. Shuang also believes that the policy has increased the instability of the stock market.

**Table 5.1.2 Long-term regression result of the daily stock market**

<b>Variables</b>	<b>Dnshrtrd (Ltv1)</b>	<b>Dnvaltrd (Ltv 2)</b>
<b>treatment</b>	0.6076*** (0.1087)	22.5686*** (0.9097)
<b>Time-dummy</b>	-1.9998*** (0.1946)	-27.2427*** (1.3965)
<b>Inter</b>	-1.3847*** (0.2915)	-21.9551*** (2.4786)
<b>log_tas</b>	4.1585*** (0.0950)	30.1383*** (0.6507)
<b>lev</b>	-7.6892*** (0.3460)	-24.7593*** (2.5735)
<b>prof</b>	0.7541 (0.9766)	171.6279*** (9.0180)
<b>Gain</b>	-3.9894*** (0.1373)	-16.4437*** (0.8982)
<b>Constant</b>	-27.2921*** (0.6867)	-205.1631*** (-39.37)
<b>R-square</b>	0.1757	0.1130
<b>obs</b>	87696	87696

*Note.* The values in parentheses are t- value.

\*\*\* and \*\* indicate significant level under one percent and five percent, respectively.

Table 5.1.2, illustrates the circulation status of the daily stock market, and we have four models in the long-term analysis. We also use the DID statistical regression method to perform the analysis and research. The treatment coefficient in Table 5.1.2 may be positive, which means that the coefficient of the daily stocks traded and their daily trade value in the treatment group is higher than the control group after considering impacts from other variables.

Moreover, one may notice that the time-dummy coefficient has a negative number in the long-term group. The posting period will decrease the daily number and value of stocks traded from the pre-period.

It is important to note that the different inter-coefficients of the explanatory variables have had different effects. In the long-term group, only the daily number and value of stocks traded have a significant effect when the circuit breaker mechanism is implemented. First, based on the data of model (Ltv1), when the inter-coefficient is negative it means that, after the policy is implemented, the treatment group will decrease the daily number of stocks traded compared to the control group. This significantly affects the treatment group. Second, in the data of model (Ltv2), the inter-coefficient is the same as the negative value. It also means that the treatment group will decrease the daily value of stocks traded after the policy when compared to the control group.

Furthermore, the log (total assets), leverage, profit, and earnings ratio are used as control variables. In the long-term, the higher leverage and earnings ratio will make the number of daily stocks traded and the daily trade value fall; the higher total assets and rate of return will make the number of daily stocks traded and the daily trade value rise.

In the long run, it has indeed reduced the daily number and value of stocks traded in CSI300 constituents by controlling other factors after implementing the policy. This means that the circuit breaker mechanism weakens the coefficient of trading shares and market liquidity during the day. The results of the long-term group showed that the liquidity index has indeed decreased and did not exacerbate the investors' behavior of disregarding the cost while selling. Subsequent selection will include short-term data

groups to further analyze the regression study of the daily circulation status under the circuit breaker mechanism.

The reference literature, Han Ao Shuang (2018), shows that "the fuse mechanism has aggravated the imbalance of the sell order, but at the same time, the rate of withdrawal is also significantly improved. This reflects the possibility that orders remain in market manipulation." Considering the fact that the order remains in control, Shuang continues to analyze the impact of the fuse mechanism on the sell order withdrawal ratio and to find that the circuit breaker mechanism does increase the withdrawal rate.

Then, according to the regression model in (Ltv1) and (Ltv2) in table 5.1.2, the daily number and value of stocks traded all fell after the implementation of the fuse mechanism. Compared to the withdrawal mentioned in the reference, we can reach the same conclusion. As the rate of withdrawal is increased, the number of shares traded in the market will be reduced. Furthermore, Shuang also indicated that the liquidity indicators improved through the regression analysis and believed that the behavior of the investor to disregard the cost was not aggravated.

## 5.2 Short-term analysis

Tables 5.2.1 and 5.2.2 explain the coefficient of regression in the short-term group. The following tables analyze the price, volume and value of the stocks.

**Table 5.2.1** Short-term regression result of stock price

<b>Variables</b>	<b>Clspc (Stp1)</b>	<b>Opnprc (Stp2)</b>	<b>Loprc (Stp3)</b>	<b>Hiprc (Stp4)</b>
<b>treatment</b>	0.1602 (0.56)	0.15 (0.53)	0.1786 (0.64)	0.1268 (0.44)
<b>Time-dummy</b>	-2.8730*** (-7.57)	-2.5805*** (-6.72)	-2.8227*** (-7.61)	-2.5508*** (-6.5)
<b>Inter</b>	-0.9993** (-2.77)	-0.9565** (-2.65)	-0.9880** (-2.76)	-0.9867** (-2.67)
<b>log_tas</b>	-3.2229*** (-21.89)	-3.2458*** (-22.16)	-3.1412*** (-21.61)	-3.3179*** (-22.44)
<b>lev</b>	-0.8198 (-1.09)	-0.9745 (-1.28)	-0.89 (-1.21)	-0.8822 (-1.14)
<b>prof</b>	-8.1054 (-1.86)	-8.9803** (-2.06)	-8.1609 (-1.89)	-8.9414** (-2.03)
<b>Gain</b>	15.2563*** (19.68)	15.3227*** (19.99)	15.0187*** (19.53)	15.5332*** (20.18)
<b>Constant</b>	40.9542*** (37.52)	41.2905*** (37.89)	39.9309*** (37.08)	42.1767*** (38.31)
<b>R-square</b>	0.5914	0.5892	0.5939	0.5864
<b>obs</b>	6176	6176	6176	6176

*Note.* The values in parentheses are t- value.

\*\*\* and \*\* indicate significant level under one percent and five percent, respectively.

Table 5.2.1 shows the regression results of the stock price indicators under the circuit breaker mechanism in short-term trading, and we obtain four models in the short-term analysis. The biggest difference is that the treatment coefficient in model (Stp1), model (Stp2), model (Stp3), and model (Stp4) all had no significance, indicating that the

treatment group and the control group had no relevant significance before the policy. In addition, the regression result of the time-dummy coefficient in the short-term group is shown as a negative number, and the result is the same as the long-term group. The price index in the post-period will be lower than that in the pre-period, including the opening price, the closing price, the highest price, and the low price.

In the short-term group, the interaction results of the stock price index all have significant regression results under the circuit breaker mechanism. According to the DID regression model, the different inter-coefficients of the explanatory variables represent the different effects that were produced. We can get the same results as the long-term group, when inter-coefficient is indeed significantly negative, which can confirm that the circuit breaker mechanism does cause the intraday stock price index to fall. It also means that the treatment group will decrease the price index when compared to the control group. This has significantly affected the treatment group. The log(total assets), leverage, profit, and earnings ratio are used as control variables. In the short-term, the higher total assets will make the stock price fall; the higher earnings ratio will make the stock price rise.

Summarizing this data, it becomes evident from the regression model that we can get the same results in the short-term group and long-term group after implementing the policy. It also led to a decline in the intraday share price relative to the other A shares that did not implement a circuit breaker mechanism, but the degree of decline in the short-term group was greater than that of the long-term group. In the short term, the circuit breaker mechanism has further exacerbated the instability of the stock market.



**Table 5.2.2** Short-term regression result of the daily stock market

<b>Variables</b>	<b>Dnshrtrd (Stv1)</b>	<b>Dnvaltrd ( Stv2)</b>
<b>treatment</b>	0.2675 (1.08)	11.1582*** (5.4)
<b>Time- dummy</b>	-1.4042*** (-6.57)	-22.363*** (-13.9)
<b>Inter</b>	-0.4096** (-2.37)	-4.5592** (-2.67)
<b>log_tas</b>	2.1720*** (14.55)	10.6268*** (13.07)
<b>lev</b>	-3.5693*** (-5.3)	4.1206 (0.89)
<b>prof</b>	-5.0048*** (-3.09)	16.2859 (0.91)
<b>Gain</b>	-1.5925*** (-8.79)	6.5778*** (4.11)
<b>Constant</b>	-12.8113*** (-12.38)	-53.6936*** (-8.01)
<b>R-square</b>	0.1842	0.1297
<b>obs</b>	6176	6176

*Note.* The values in parentheses are t- value.

\*\*\* and \*\* indicate significant level under one percent and five percent, respectively.

From Table 5.2.2, the daily circulation status is straightforward, and we have four models in the short-term analysis. In the short-term group, both the daily number and value of stocks traded have a significant effect when the circuit breaker mechanism is implemented. The treatment coefficient in model (Stv1) can be found to be significant, which means that daily value of stocks traded in the before treatment group is higher than the before control group after considering impacts from other variables.

Subsequently, the coefficient of time-dummy is negative in the short-term group. The post-period will decrease the daily number and value of stocks traded from the pre-period.

According to the DID regression model, the different inter-coefficients of the explanatory variables represent the different effects. Furthermore, according to the regression results obtained in the data of model (Stv1) and (Stv2), the interaction coefficients are indeed significant and negative. It can be confirmed that, when controlling other factors after implementing the policy, the daily number and value of stocks traded in CSI300 is significantly reduced. Namely, the treatment group will decrease the daily number and value of stocks traded when compared to the control group after the policy.

The log (total assets), leverage, profit, and earnings ratio are used as control variables. In the long-term, the higher leverage, earnings ratio, and rate of return will make the number of daily stocks traded and the daily trade value fall; the higher total assets will make the number of daily stocks traded and the daily trade value rise. This result indicates that the circuit breaker mechanism weakens the number of trading shares and liquidity in a trading day. Also, we obtained the same results in the short-term and long-term group—meaning that the liquidity indicator has indeed decreased, but it did not exacerbate the investors' behavior to disregard costs when selling.

In summary, both the long-term and short-term groups achieved similar results, but the intraday stock price drop is more severe in the short-term while the trade volume decrease is more significant in the long-term. Furthermore, both the long-term group and the short-term group show that the circuit breaker mechanism does reduce the liquidity according to the regression results of the daily stock circulation status, indicating that the stock price decline is not caused by investors disregarding the stock cost when selling.



## CHAPTER 6 Conclusion

This paper focuses on analyzing the impact of including a circuit breaker on the China stock market. Based on the literature, long-term and short-term econometric analysis methods are used to verify the impacts of a circuit breaker. In terms of variable selection, the explanatory variables were selected with reference to previous scholars' research, which focuses on the price on the day and liquidity changes of the stock market. According to the statistical analysis results, both the transaction amount and the number of shares traded declined during the period when the circuit breaker was implemented. Furthermore, the price drop is more severe in the short-term, while the trade volume decrease is more significant in the long-term.

According to the statistical results from the literature, the selling volume increased and the buying volume decreased during the period when the circuit breaker was implemented. In summary, the psychological factor of expecting a price decline led to a massive decline in shares traded, resulting in a large amount of selling; thus, the stock index fell. The literature has also mentioned that markets other than those of CSI300 are also affected by the magnet effect, which is consistent with the empirical evidence. In addition, the implementation of a circuit breaker is related to the country's market and institutional background, and applying the Western system directly to the Chinese capital market may not be feasible.

## **6.1 Core defect in the Chinese circuit breaker**

The core defect in the Chinese version of the circuit breaker is the panic of the investors pertaining to liquidity when the market is undergoing drastic fluctuation. Although the liquidity obtained from the regression analysis was in a decline, both the transaction amount and the number of shares traded declined during the period when the circuit breaker was implemented. The psychological factor of expecting a price decline led to a massive decline in shares traded, resulting in a large amount of selling. However, we didn't get the same, worse result under the circuit breaker mechanism implemented in the US through the past lecture review. Therefore, we speculate that there are three other factors may cause this result.

### **6.1.1 Two mechanisms are implemented together**

The China A shares market implements a circuit breaker when a price limit has already been implemented. Implementing these two mechanisms together significantly limits the market liquidity. In December 1996, a price limit was introduced to the Chinese stock market. A price limit is very similar to a circuit breaker. Although there are restrictions on the index and the gain or decline of each stock, the market is still tradable and liquidity remains. However, a circuit breaker is different because when the market stops trading after the CSI300 Index, this triggers the seven percent circuit breaker threshold; thus, the market liquidity drops sharply. When the CSI300 Index is approaching the threshold at which market suspension will be triggered, investors who want to sell their stocks will preemptively trade out of the fear of liquidity loss. This results in the sharp fall in stock prices. On the other hand, investors who want to buy stocks will delay their transaction to wait for a better price. When these two factors are superimposed, the purchase volume is reduced relative to the selling volume, which will then accelerate the stock price to reach the circuit breaker threshold. Most of the

literature mentions that the circuit breaker threshold seems to have an invisible magnetic attraction, the "magnet effect." The "magnet effect" is actually the common panic of the investors pertaining to the lack of liquidity when a circuit breaker is implemented.

### **6.1.2 Chinese internal stock market structure**

Individual investors contribute a large portion of all the investors in the Chinese stock market. According to incomplete statistics, less than 17% of the market value of stocks, including public and private fundraising and insurance institutions, is held by large institutional investors. Among them, the largest share from raised funds is only about 7.6%, while the remaining 83.55% is held by individual investors. Therefore, this clearly reflects the situation of China A shares, where individual investors are the main investors.

Compared with mature markets, such as the US stock market, investment and pension funds from US investors and investors from foreign institutions contribute a very significant portion to the stock market. Therefore, considering the Chinese market, where individual investors contribute the most, group panic can easily be triggered and is difficult to resolve—resulting, in eventual "herd behavior."

The Chinese financial market is not perfect. Although the Chinese stock market has set a cooling period as a buffer for a circuit breaker, which is the same as other mature markets, this system does not consider basic Chinese market characteristics. Thus, these 15 minutes cannot make a real difference. Because the investors can hardly receive effective market information, group panic cannot be restrained; therefore, the market stability cannot be improved. In addition, there has been excessive interference in the

Chinese stock market. For example, in the stock market crash in 2015, the stock regulatory authority suspended stock index futures to prevent speculation by some institutions. This eventually resulted in the inability to perform risk hedging by stock index futures during sharp turbulence in the stock market in early 2016. In fact, during the first round of the stock market crisis in 2015, the hedging effect by stock index futures had greatly resolved the selling pressure in the stock market. From this experience, it can be concluded that stock index futures, stock index options, and so on can play a huge role in risk hedging.

### **6.1.3 Problems of the Chinese version of the circuit breaker**

The incompleteness of the setup of the Chinese circuit breaker resulted in its failure. Compared with mature markets, the interval between the two thresholds set for the Chinese circuit breaker are too small, ranging from five percent to seven percent. On the other hand, the thresholds for the US stock market are 7% and 20%. Besides the thresholds set, there are still many flaws in the Chinese stock market compared with the mature US stock market. Because most of the investors are small- and medium-sized investors, various irrational investments may be carried out. The fundamental problem is that the Chinese financial market needs further development and improvement.

Because the Chinese stock market sets a small interval between the thresholds for the circuit breaker and because most of the investors are individual investors, the spread of panic can easily result in the market reaching seven percent from the five percent price drop—eventually resulting in the market stopping trading for the whole day. According to the literature, the "magnet effect" of the circuit breaker will be amplified during this process, which eventually leads to a continuous decline in the market index. Thus, the

two thresholds set for the circuit breaker have lost the usefulness that they should have. In addition, there are innate disadvantages when setting the circuit breaker by referring to CSI300 as a standard. This is because CSI300 grades its component stocks by considering if there is a large share of that stock in the trading market. The components of CSI300 have high liquidity and have been active in the trading market. Therefore, theoretically, the CSI300 Index can represent the Chinese stock market very well. However, in essence, the situation of nearly 3,000 listed companies in the entire market cannot be well represented by these 300 component stocks. In addition, the CSI300 Index was launched in 2005; the Chinese stock market and the component stocks of CSI300 have undergone tremendous changes within the intervening years. As there are increasingly more issuances of new shares, it is difficult for CSI300 to represent the current whole market performance. According to the situation after the implementation of the circuit breaker in 2016, it seems that using only the CSI300 Index as a standard will result in the failure of the circuit breaker. It cannot maintain market stability and may produce negative emotions.

In conclusion, the implementation of the circuit breaker inevitably failed for the following three reasons: (1) the implementation of the circuit breaker based on the price limit system is not very compatible; (2) the choice of a target index is unreasonable, but it is difficult to make a better choice; and (3) an improvement in the structure of investors is urgently needed.

The results in this study are similar to the research analysis from Gerety and Mulherin (1992). Implementing the circuit breaker mechanism will increase the uncertainty of the reverse transaction before suspending trading, prompting the trader to overreact to the market fluctuations and even leave the market. It also supports the argument by



Chinese scholar Song Zhenzhen (2017), which asserts that the stock yield in CSI300 is asymmetrical between a crash and burn, and it is easier to touch the breakpoint in the down direction. The retail investors will assess the situation logically, but the collective irrationality strengthens the magnet effect and ultimately leads to the loss of liquidity in the market. In this study, we obtained the same conclusions as G.J. Santoni and Tung Liu (1993). We also used the daily and intraday data to analyze the impact of the circuit breaker mechanism on price fluctuations. The final conclusions differed, and the daily data confirmed that the mechanism could not reduce price volatility.

The factors affecting a market are definitely not only caused by a policy but also by a combination of many factors. Combining the above three speculate factors, the circuit breaker mechanism is only a tool to help the market stabilize. However, by implementing more than one supervision tool and being under the closed investment environment will further aggravate the market panic. The results of the long-term group showed that the liquidity index has indeed decreased and did not exacerbate the investors' behavior of disregarding cost while selling. However, the panic caused in short-term results make the stock price and trading volume fall sharply, and the stock price volatility loses control.

## 6.2 Suggestions for the Future Development

In summary, we should examine the circuit breaker objectively. It is only a tool. The result of implementing a circuit breaker mainly depends on the environment in which it is implemented. Ultimately, the positive and negative aspects do not have much of a relationship with the circuit breaker itself. To expect the implementation of the circuit breaker to produce better results, it should adapt to the Chinese stock market environment. The easiest and quickest way to do this is to increase the threshold interval of the circuit breaker. On this basis, floating thresholds should be considered. The values should be adjusted according to the actual market conditions, rather than using fixed values. It is also possible to integrate the circuit breaker with the price limit system; for example, the circuit breaker may only be implemented in an individual stock so that these two systems can better promote each other and work together.

Transparency and information disclosure are very important for the current Chinese stock market. Both are important indicators of market maturity. Only when the transparency of the market continues to increase and the situation of asymmetric information is alleviated can investors rationally choose their investment behavior in the market. This is conducive to establishing a stable market.

However, the information disclosure system of the Chinese stock market is still not perfect. Some listed companies disclose fake and misleading information, and some investors use insider information to obtain an illegal income. The enhancement of information transparency should be given more attention compared with the implementation of a price regulation. According to the empirical analysis and the literature, the effect of the price restriction system on the stability of the market is

limited. Excessive supervision will only bring side effects to the market. Regulators should pay more attention to the disclosure of information and the establishment of the investor's confidence, rather than simply controlling the stock prices directly. Regulators must be aware of the root causes of the price fluctuations to solve the fundamental problems of the irrational behavior of investors but not directly intervene in the market. If the information disclosure system is complete, the basic information of the stock market can be fully and completely disclosed, and when there is a reasonable information transmission mechanism, the market can play a greater role; eventually, market speculation can be reduced.

In conclusion, the failure of the circuit breaker reflects the various problems that exist in the Chinese stock market itself. In financial development, the overall construction of the financial market must be given attention. At the same time, the supervision and regulation system should be constantly improved.

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