

The Impact of Financial Crisis and Trade Relevance on the Market Reactions in Taiwan's Financial Industry

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ABSTRACT: *Previous literature seldom investigates whether financial crisis events or events caused by trade-related countries have great impact on stock returns. However, the event characteristics and occurrence areas are critical of financial contagion effect. For these reasons, this study investigates market response of international events from 2008 to 2016 to confirm the financial contagion theory by examining the stock returns of Taiwan's financial industry. We examine whether financial crisis causes greater market response of Taiwan's financial industry than non-financial crisis event since Taiwan's financial industry invest in foreign funds or stocks. This study uses event study method to observe the abnormal returns on the event day. We further use analysis of variance (ANOVA) to compare the impact of financial crisis events on stock returns with the impact of non-financial crisis events on stock returns in Taiwanese listed financial industry. In addition, we compare the market response between events occurred in countries that have high trade relevance to Taiwan and countries that have little association with Taiwan. The results show that Taiwan financial industry had significantly abnormal returns when international financial crisis events happened. A price co-movement in other market causes a shock in Taiwan's stock market. Furthermore, ANOVA analysis results show that impact of international financial crisis events is larger than that of international non-financial crisis events in Taiwan's financial industry, which proves financial contagion theory. Moreover, market response to the events occurred in Taiwan's trade related countries, U.S. and Japan, is larger than the events occurred in other countries that contain low relevance to Taiwan.*

KEYWORDS: *Financial industry, Abnormal Return, Cumulative Abnormal Return, Market Response, Analysis of variance*

I. INTRODUCTION

This study explores the impact of financial crisis events on stock returns in Taiwanese financial industry. According to "Financial Supervisory Industry Development Policy White Paper" announced by FSC on May 17, 2016, the total value of financial industry output in 2015 reached NT \$1.09 trillion, preceded only by manufacturing industry, wholesale and retail trade, and real property industry. It accounts for up to the GDP 6.56% in Taiwan. It is obviously that the financial industry is important in Taiwan, so this is why we focus on the market reactions to the financial crisis events in Taiwanese financial industry. By the end of 2015, Taiwan's financial industry's asset management (including overseas funds) scale up to NT \$13.8823 billion. The financial industry occupies an important indicator in the economic structure of Taiwan. The main commodities of asset management chosen by Taiwanese investors including bank products, stock market, funds and insurance policies. The mostly trade foreign funds focus on products, foreign stocks, and ETFs are concentrated in the United States, Luxembourg and Hong Kong. With the diversified investment channels in different countries and market, the international financial products in Taiwan's financial industry are increasing. Therefore, listed financial industry in Taiwan are affected by international financial crisis events on Taiwan. Financial economic fluctuations related studies investigate the chaos caused by specific events (Bernanke and Gertler, 1989; Bernanke, 1983), including stock market volatility caused by natural disasters (Shelor, Anderson, and Cross, 1990; Worthington and Valadkhani, 2004), and stock market volatility caused by terrorist attacks (Brounen and Derwall, 2010; Carter and Simkins, 2004; Drakos, 2004). Brounen and Derwall (2010) studied the impact of terrorist attacks on the equity markets in eight countries on an event day, with

abnormal returns on the terror attack days and quickly returning to normal operation following market reaction. From the above documents, it can be understood that financial and non-financial events will affect the local stock market and the stock markets of other countries. As the international situation becomes more and more complicated, international events will also affect the Taiwan stock market. Allen and Gale (2000) believe that the financial crisis has an important impact on the economy, which will increase the cost of intermediation and credit restrictions, eventually leading to low economic growth and economic recession. Kodres and Pritsker (2002) pointed out the infections through the financial markets between the Mexico crisis in 1995, the Asian financial crisis in 1997-1998, the Russian financial crisis in 1998 and the currency crisis in Brazil in 1999 cause the fluctuation in financial asset markets of many countries. From the above literature, it is understood that the financial crisis will cause the stock market to decline due to the systemic risk. The major international events to be explored in this study are systemic risks caused by the overall financial crisis factors. Systematic risk occurs outside the enterprise which affects firm value and cannot be eliminated by portfolio, such as exchange rates, interest rates, inflation, energy crises, political transition, terrorist attacks, war, natural disasters, economic cycles and macroeconomic policies. “Contagion” has become a scholar of research in the volatile international situation, due to the financial crisis lurking in various countries' financial markets. Kodres and Pritsker (2002) defined the term “Contagion” as a market price change that led to another market being impacted.

Mollah, Quoreshi, and Zafirov (2016) define the term “Contagion” to point out that the volatility in a crisis-affected country shifts to another country and the volatility during the crisis is significantly higher than before. However, some scholar proposed herding hypothesis. They stated that massive behavior is a group of investors following the same decisions of other investors, likes buying hot stocks at the same time and making investment decisions. In spite of they are not the best choice to follow popular beliefs, they will still mimicking the actions of the majority of the population (Devenow and Welch, 1996). Chang, Cheng, and Khorana (2000) studied the CSAD model and found that there were no herd behavior in developed markets, whereas there was a significant herd behavior in Taiwan and South Korea that belonged to emerging markets. Because of herding behaviors, Taiwan's financial industry stocks may respond to international non-financial events. However, market response to financial crisis events is greater than non-financial events because the crisis will spread to Taiwan stock market, affecting the Taiwan-listed financial industry according to financial contagion theory. This study attempts to explore whether the impact of financial crisis events on the share prices of Taiwan's financial industry is larger than the impact of non-financial events. We choose four financial crisis events from 2008 to 2015: the “declaration of Lehman Brothers bankruptcy” in the United States, “European debt crisis and Greece credit rating downgraded”, “Russian financial crisis” and the “Rejection of Greek bailout referendum”. We selected three non-crisis events in 2016 – “British Brexit referendum”, “2016 U.S. presidential election”, and “Failure of Italy constitutional referendum”. This study examines whether the market response of financial crisis events is larger than that of non-crisis events in Taiwan's financial industry.

The analysis of market reactions to international financial events can be a reference for investors in future investment decisions. Since Taiwan is surrounded by the sea and the natural resources are scarce, the domestic market is not large. Taiwan's economic growth is driven by the demand of the international market. Foreign trade has become the lifeline of Taiwan's economic development. According to the trade statistics from 2006 to 2016, Taiwan's trade export value is greater than the total import value which called trade surplus, that is, Taiwan is an export-oriented economy. Since Taiwan is the export-oriented country, the economy is closely related to the trade between United States, Europe, Southeast Asian and other countries around the world. Juswanto and Ali (2016) further show that the economies of island-type countries are small, mostly relying on international trade, and they are therefore vulnerable to economic events and changes in countries that are closely connected with Taiwan. Figure 1 shows that top five Taiwan's trade related countries are China, America, Japan, Hong Kong and Korea. It is indeed curious whether Taiwan's stock market response will be more affected by American and Japanese events when there is any economy, trade or politics change in these two countries.

Therefore, the motivations of our study is to explore whether the international financial events occurred in U.S. and Japan, two countries with a high degree of trade relevance to Taiwan have a more pronounced effect on stock prices than countries with low trade associations with Taiwan among the financial industry companies in Taiwan. This study chooses three Taiwan-related events are the “declaration of Lehman Brothers bankruptcy” on Sep. 16, 2008 in the United States, “the rejection of America emergency economic stabilization act” on Sep. 29, 2008, and the announcements of negative interest rate policy in Japanese Banks on January 29, 2016. On the other hand, this study chooses three Taiwan-unrelated events are “European debt crisis and Greece credit rating downgraded” on Dec. 16, 2009, “Russian financial crisis” on Dec. 1, 2014 and “the financial storm of Swiss France” on Nov. 15, 2015. We compare the effect of Taiwan-related events with that of Taiwan unrelated events. The purposes of our research are as the following three points. First, we examine whether the stock price of Taiwan's financial industry showed abnormal returns during the international financial crisis events. Second, we explore whether the abnormal return in financial industry caused by international financial crisis events is more significant than the abnormal return caused by the other events among the abnormal returns arising from major international events. Third, we investigate whether the abnormal returns of events occurred in Taiwan-related countries are more significant than those occurred in Taiwan unrelated countries among the abnormal returns arising from major international events.

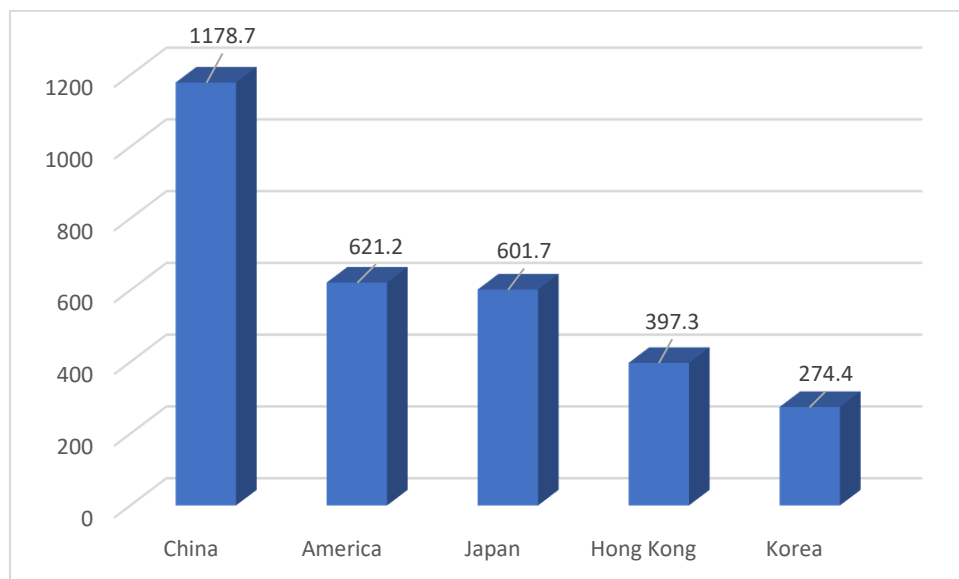


Figure 1 Taiwan's international trade amount and trade rankings with China, America, Japan, Hong Kong and Korea in 2016 (unit: \$10 million)

II. RESEARCH HYPOTHESIS

Confusion caused by finance is often used as one of the factors in studying economic fluctuations (Bernanke and Gertler, 1989; Bernanke, 1983). Kodres and Pritsker (2002) defined “Contagion” as a market price change that led to another market price fluctuations. Financial contagion literature emphasize the financial crisis impact on firm value. Tabak et al. (2016) define financial contagion theory as the change in price in one market that causes other changes in market prices. Allen and Gale (2000) pointed out that when individual financial institutions are facing banking crises, other financial institutions also suffer losses due to exchanges between financial institutions. In Gai and Kapadia (2010)'s study of the special financial crisis, the linkages among financial intermediaries can widen the scope of the infection. The international financial crisis will reduce the bond or stock values issued by foreign companies. Taiwanese investors are impressed that Taiwanese financial holding companies invest these foreign issued bonds and stocks, so they sell the stocks issued by Taiwanese financial holding companies. Based on "financial contagion theory", the international financial crisis will spread to stock

returns of Taiwan stock market, affecting the Taiwan-listed financial industry. For the reason, we construct hypothesis 1:

Hypotheses 1: During the international financial crisis events, Taiwan's financial industry showed abnormal returns. In the face of rapidly changing international situations, rational investors analyze and invest in real-time international news and market dynamics. However, irrational investors blindly follow the investment decisions of the market to buy and sell the same stocks. Kahneman and Tversky's prospect theory (1979) point out that irrational investors are not completely random and will go in the same direction. Shiller (1984) indicates that when investors listen to the same message in the market, the phenomenon of blind follower will be more obvious. Because of herding behaviors, Taiwan's financial industry stocks may respond to international non-financial events. The impact of major international events also exists in Taiwan's financial industry stock. When the unexpected international events affect stock prices in other countries, Taiwan investors also follows their investing behaviors even though these international events do not directly affect the wealth of Taiwanese financial holding companies or institutions. According to herding theory on investors' investment behavior, our paper constructs hypothesis 2.

Hypothesis 2: During the period of international non-financial-crisis events, Taiwan's financial industry showed abnormal returns. Forbes and Rigobon (2002), Mollah et al. (2016) and Tabak et al. (2016) define the theory of financial contagion as the change in the price of a market that causes other changes in market prices. Mollah et al. (2016) demonstrated the impact of financial contagion theory on developed countries and emerging markets during the financial crisis. Allen and Gale (2000) pointed out that when individual financial institutions are facing banking crises, other financial institutions also suffer losses due to exchanges between financial institutions. De Nicolo and Kwast (2002) argue that the integration of the financial industry has complicated the financial system and increased the systemic risk. In the event of a crisis, systemic risks will spread easily. The international financial crisis will reduce the bond or stock values issued by foreign companies. Taiwanese financial holding companies invest these foreign issued bonds and stocks, so Taiwanese investors are impressed that financial crisis reduces the values of financial holding companies; hence, investors tend to sell the stocks issued by Taiwanese financial holding companies. Consequently, stock prices of Taiwan-listed financial industry decrease substantially. According to financial contagion theory, we construct the following hypothesis 3.

Hypothesis 3: Among the abnormal returns arising from major international events, the abnormal returns of international financial crisis events are more significant than those of non-financial incidents. Boyd and Graham (1986) pointed out that when financial institutions are free to invest in new lines of business, diversification has a strong correlation with the risk of failure. The expansion of bank holding companies to new lines of business will increase their risk. During the US subprime mortgage crisis, Lee et al. (2014) proved the theory of empirical finance existed in countries associated with the United States, because its US market had financial infections in the global markets of Japan, South Korea, Belgium, Germany, the Netherlands and the Eurozone. Ben Saïda (2018) pointed out that since the global financial crisis in 2008 and the European sovereign debt crisis in 2009, its financial risk impact has gradually spread from the core countries to relevant countries. From the viewpoints, international events occurred will cause the variations of the stock prices in Taiwan's financial industry. Forbes and Rigobon (2002) proposed that the financial market of a country collapse, which will result in shocks of the financial system that is close to the country; namely, the financial contagions are apparent for countries that have close connections. The fallen market has different influences with the region as the trade degree of the country differs. It is inferred that when a financial event occurs in a country with a high degree of trade relevance to Taiwan, it will give rise to an abnormal returns Taiwan's financial industry in large extent. Therefore, we construct Hypothesis 4: Hypothesis 4: Among the financial industry companies in Taiwan, the international financial events occurred in countries with a high degree of trade relevance to Taiwan have a more pronounced effect on stock prices than countries with low trade associations with Taiwan.

III. RESEARCH SAMPLE

Our research sample is the Taiwanese listed financial companies, including financial holding companies, Taiwanese banks, securities dealer and insurance companies. Forty-eight financial companies are collected in our research. Data of stock prices and returns are collected from Taiwan Economic Journal (TEJ), Public Information Observatory, Taiwan Stock Exchange and Internet-related information. Table 1 lists the event dates observation number, events of financial crisis events and non-financial crisis in our research and events of international events occurred in Taiwan related and Taiwan unrelated countries.

Table 1 Event dates and evens in our research Panel A: Financial crisis and Non-financial crisis events

Attributes	Event day	Number	Event
Financial Crisis Events	2008/09/16	44	Declaration of Lehman Brothers' bankruptcy
	2009/12/16	45	European debt crisis and Greece credit rating downgraded
	2014/12/01	43	Russian financial crisis
	2015/07/06	43	Rejection of Greek bailout referendum
Non-Financial Crisis Event	2016/06/27	42	British Brexit referendum
	2016/11/09	42	2016 US presidential election
	2016/12/05	42	Failure of Italy constitutional referendum

Panel B: Events occurred in countries that are trade-related and unrelated to Taiwan

Attributes	Event day	Number	Event
Taiwan-Related Events	2008/9/16	44	Declaration of Lehman Brothers' bankruptcy
	2008/9/30	47	The rejections of America emergency economic stabilization act
	2016/1/29	48	The announcements of negative interest rate policy in Japanese Banks
Taiwan-unrelated Events	2009/12/16	45	European debt crisis and Greece credit rating downgraded
	2014/12/1	43	Russian financial crisis
	2015/1/16	46	The financial storm of Swiss France

IV. METHODOLOGY

Event study: This work utilizes event study method to understand whether the event of financial crisis affects company stock prices in the financial industry. Event study was first proposed by Ball and Brown et al. (1968) and it is the empirical method used to understand the relevance between stock market prices and specific events. If the event is significant, the company's stock price fluctuating condition will be different from the performance under no such event and the abnormal return rate will be generated (Lam et al., 2016; Tao, Liu, Gao, and Xia, 2017). The event study method focuses on the exploration of the impact of the occurrence of the event on stock

prices. The main purpose of event study is to test abnormal returns in the use of statistical methods so as to understand whether the event affects company stock prices and whether securities prices reflect all available published information. To examine the abnormal returns during the announcement of financial crisis, this study employs the market model to calculate the abnormal returns and cumulative abnormal returns accruing to a stockholder consequence to these events in Taiwan's financial industry. The rates of returns are defined as the price change divided by the beginning prices, so the positive rates of returns are derived from price increases and negative rates of returns are derived from price declines. This paper uses the rate of stock returns to indicate the stock price changes during the financial crisis event announcement periods.

This study sets the event day as day 0 for each event. Negative days represent days prior to the event date and positive days represent days subsequent to the event date. The estimation interval is the period from day -260 to day -11 and the event interval is the period from day -10 to day 10. For each firm i , the market model

parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated by regressing each firm's stock returns against the return on market over an estimation period (250 days in length, ending 11 days before event day) written as equation (1):

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + e_{i,t} \quad (1)$$

where $R_{i,t}$ and $R_{m,t}$ are the rates of returns on day t for the i th firms and Taiwan stock exchange index. and in equations (1) are estimated using the data during the estimation interval, so we can use equation (1) to figure out the expected returns in the event interval. Then, the abnormal returns are calculated as the actual minus expected returns in equation (2):

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \quad (2)$$

In equation (2), we compute the abnormal return on day t ($AR_{i,t}$) by comparing the actual return on day t , $R_{i,t}$ with its expected returns $(\hat{\alpha}_i + \hat{\beta}_i R_{m,t})$. Next, cumulative abnormal returns from the 10 day prior to the event day to day T_1 ($T_1 = -10, -9, -8, \dots, 9, 10$) can be expressed as equations (3):

$$CAR(-10, T_1) = \sum_{t=-10}^{T_1} AR_{i,t} \quad (3)$$

In order to examine the statistically significance of abnormal returns on the day when great financial crisis events occur, this study used the parametric traditional T-statistics, cross-sectional T-statistics and sign test T-statistics.

ANOVA Test: To compare the abnormal returns difference between the financial crisis and non-financial events, we perform ANOVA test to examine their difference. By F-statistics, we can examine whether the extent of abnormal return is significantly greater for the financial crisis events than other events. Four financial crisis events are the "declaration of Lehman Brothers bankruptcy" on Sep. 16, 2008 in the United States, "European debt crisis and Greece credit rating downgraded" on Dec. 16, 2009, "Russian financial crisis" on Dec. 1, 2014 and the "Rejection of Greek bailout referendum" on July 6, 2015. On the other hand, three non-crisis events in our research are "British Brexit referendum" on June 27, 2016, "U.S. presidential election" on Nov. 9, 2016, and "Failure of Italy constitutional referendum" on Dec. 5. By F-statistics, we compare the effect of financial crisis events with that of non-financial crisis events. Three Taiwan-related events are the "declaration of Lehman Brothers bankruptcy" on Sep. 16, 2008 in the United States, "The rejection of America emergency economic stabilization act" on Sep. 29, 2008, and the announcements of negative interest rate policy in Japanese Banks on January 29, 2016. On the other hand, three Taiwan-unrelated events are "European debt crisis and Greece credit rating downgraded" on Dec. 16, 2009, "Russian financial crisis" on Dec. 1, 2014 and "the financial storm of Swiss France" on Nov. 15, 2015. By F-statistics, we compare the effect of Taiwan-related events with that of Taiwan unrelated events.

V. EMPIRICAL RESULTS

Results of event study: To test the hypothesis H1, we use event day methodology and financial listed sample firms in Taiwan stock exchange or over-the-counter (OTC) market. Figure 2 shows the results of abnormal returns on financial crisis event days. The abnormal return rate was significantly negative on the event day of the “declaration of Lehman Brothers bankruptcy” on Sep. 16, 2008 in the United States, “European debt crisis and Greece credit rating downgraded” on Dec. 16, 2009 and “Russian financial crisis” on Dec. 1, 2014. The cumulative abnormal return rate gradually decreased to the day of the event. The above result can verify the financial contagion theory and supports the hypothesis H1. Also, Table 2 shows the T-statistics results of abnormal returns during financial crisis periods. The day of the “rejection of Greek bailout referendum” on July 6, 2015 had a significantly negative abnormal returns in the Taiwanese financial industry according to the results of the cross-sectional T-statistics and sign test T-statistics. The abnormal returns on the date “rejection of Greek bailout referendum” is smaller than other three financial crisis events since “rejection of Greek bailout referendum” occurs after “Greece credit rating downgraded” event. The unexpected shock of investors will be decrease, so the market response of “rejection of Greek bailout referendum” is less than that of “Greece credit rating downgraded”.

Table 2 Abnormal Returns during Financial Crisis Period

Panel A: Lehman Brothers' bankruptcy						
Event day	AR(%)	Traditional T-statistics		Cross-sectional T-statistics		Sign Test T-statistics
-1	-1.3577	-4.6337	***	-4.5176	***	-3.6181 ***
0	-1.2192	-4.1610	***	-4.1565	***	-2.7136 ***
1	-3.064	-10.4568	***	-5.0074	***	-3.3166 ***
2	-3.0246	-10.3226	***	-10.3237	***	-5.1257 ***
3	-1.5711	-5.3620	***	-3.3042	***	-2.1106 **

Panel B: European debt and Greece credit rating downgraded						
Event day	AR(%)	Traditional T-statistics		Cross-sectional T-statistics		Sign Test T-statistics
-1	0.4767	1.4573		3.4588	***	2.2361 **
0	-0.6109	-1.8677	*	-4.1952	***	-4.3231 ***
1	0.2039	0.6234		1.5127		1.6398
2	-0.2255	-0.6893		-2.1153	**	-1.6398
3	-0.3687	-1.1273		-3.0489	***	-3.4286 ***

Panel C: Russian crisis						
Event day	AR(%)	Traditional T-statistics		Cross-sectional T-statistics		Sign Test T-statistics
-1	0.0542	0.3916		0.8682		-0.4575
0	-0.6886	-4.9701	***	-5.8637	***	-4.4225 ***
1	0.4179	3.0162	***	1.5764		0.4575
2	0.9588	6.9208	***	3.6366	***	1.0675
3	-0.0368	-0.2659		-0.2588		-0.1525

Panel D: Rejection of Greek bailout referendum					
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics	
-1	0.2186	1.4972	2.3511 **	1.9825 **	
0	-0.2107	-1.4431	-2.2607 **	-1.9825 **	
1	0.6141	4.2060 ***	6.4182 ***	5.3374 ***	
2	0.0845	0.5784	0.4685	1.9825 **	
3	-0.6081	-4.1646 ***	-3.1983 ***	-2.8975 ***	



Figure 2 Abnormal Returns (ARs) on Financial Crisis Event Day (%) Besides, Figure 2 shows the abnormal returns began to show a positive trend after the event day of the “European debt crisis and Greece credit rating downgraded” on Dec. 16, 2009, “Russian financial crisis” on Dec. 1 and “rejection of Greek bailout referendum” on July 6, 2015. Because Greece and Russia has not close connections with China. This suggests that the investors respond to the “rejection of Greek bailout referendum” for only one day, which was consistent with the market efficiency hypothesis. On the other hand, Figure 3 shows that the abnormal return rate of non-financial crisis days. The abnormal return rates gradually decreased on the event day of “British Brexit referendum” on June 27, 2016 and “Failure of Italy constitutional referendum” on Dec. 5, 2016. Even though British Brexit referendum and Italy constitutional referendum are unrelated to the wealth of Taiwanese listed companies, “British Brexit referendum” on June 27, 2016 and “Failure of Italy constitutional referendum” on Dec. 5, 2016 still had a great impact on the Taiwanese stocks of financial industry. Table 3 shows that the stock prices of financial industry showed a downward trend, which is in accordance with herding theory. The abnormal return rates gradually increased on the event day of “2016 U.S. election” on Nov. 9, 2016 and the stock prices of financial industry follows an upward trend with the worldwide stock markets. The above results can verify the herding theory and supports the hypothesis H2.

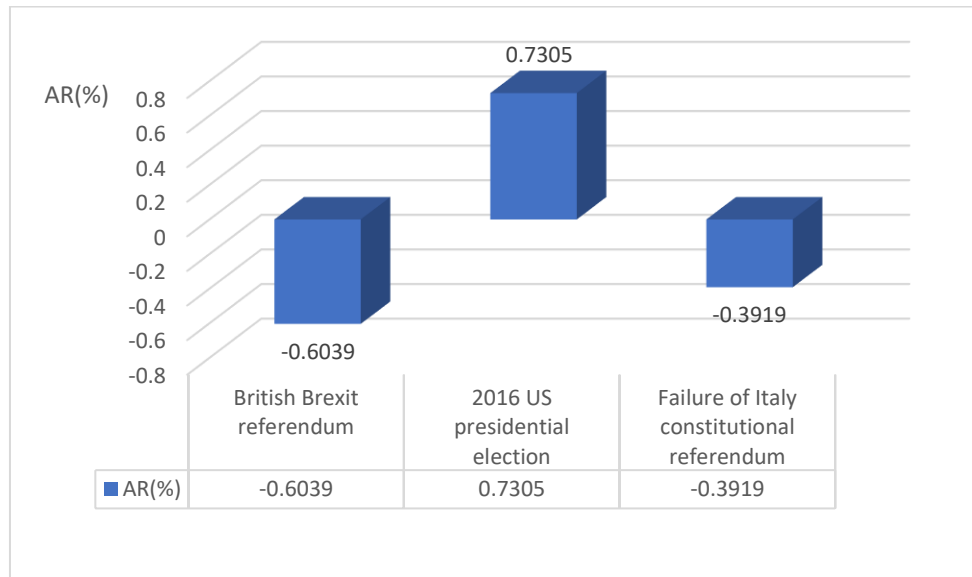


Figure 3 Abnormal Return on Non-Financial Crisis Event Day (%) Table 3 Abnormal Returns during Non-Financial Crisis Period (%)

Panel A: British Brexit referendum				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.0774	0.4339	0.4939	0.9258
0	-0.6039	-3.3831 ***	-4.0078 ***	-3.3947 ***
1	-0.1728	-0.9681	-1.3044	-4.0119 ***
2	0.0291	0.1628	0.2187	-1.2344
3	-0.2157	-1.2085	-2.0645 **	-2.7775 ***

Panel B: 2016 US presidential election				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.2781	1.8370 *	3.0985 ***	2.1602 **
0	0.7305	4.8249 ***	5.9093 ***	4.6291 ***
1	-0.1612	-1.0645	-1.0243	-3.0861 ***
2	1.4476	9.5616 ***	5.6310 ***	6.4807 ***
3	1.5092	9.9686 ***	5.8688 ***	5.5549 ***

Panel C: Failure of Italy constitutional referendum				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.8813	5.8422 ***	7.3774 ***	6.1721 ***
0	-0.3919	-2.5976 ***	-3.5695 ***	-3.7033 ***
1	-0.3763	-2.4944 **	-2.5192 **	-3.3947 ***
2	0.065	0.4307	0.3217	0.0000
3	0.1442	0.9560	0.9427	0.9258

We use event day methodology to test the market response of events occurred in Taiwan's related and unrelated countries. Figure 4 displays the results of abnormal returns on U.S. and Japanese event days. Table 4 further presents that the abnormal return rate was significantly negative on the event day of the "declaration of Lehman Brothers bankruptcy" on Sep. 16, 2008 in the United States, and "the United States rejection of the \$700 billion "Economic Stability Emergency Act"" on Sep. 29, 2008. The cumulative abnormal return rate gradually decreased to the day of the event, which suggests the herding behaviors of investors. Also, Table 4 shows the T-statistics results of U.S. and Japanese events. On September 15, 2008, the Lehman Brothers in the United States went bankrupt, which will present a negative abnormal return to the stock price of Taiwan's financial industry stocks. On September 29, 2008, the United States vetoed the \$700 billion "Economic Stability Emergency Act", which provided negative abnormal returns to the stock prices of Taiwan's financial industry stocks. On January 29, 2016, the Bank of Japan announced a negative interest rate policy, so hot money flowed into Taiwan, which provided positive returns to Taiwan's financial industry stocks. Because Taiwan is close to U.S. and Japan in international trades, the substantial events in U.S. and Japan deeply cause market response in Taiwan financial industry.

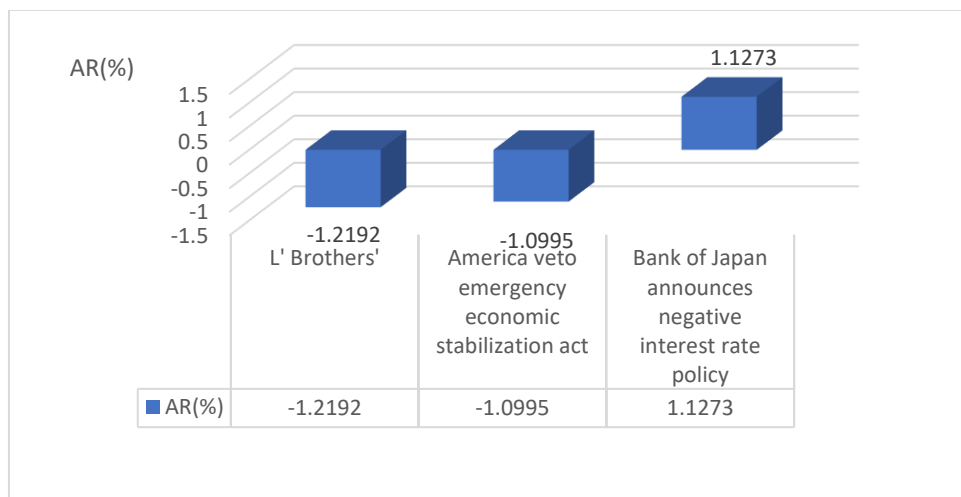


Figure 4 Abnormal Returns of Events Occurred in Taiwan Related Countries (%)

Table 4 Abnormal Returns of Events occurred in Taiwan Related Countries (%)

Panel A: Lehman Brothers' bankruptcy						
Event day	AR(%)	Traditional T-statistics		Cross-sectional T-statistics		Sign Test T-statistics
-1	-1.3577	-4.6337	***	-4.5176	***	-3.6181 ***
0	-1.2192	-4.1610	***	-4.1565	***	-2.7136 ***
1	-3.064	-10.4568	***	-5.0074	***	-3.3166 ***
2	-3.0246	-10.3226	***	-10.3237	***	-5.1257 ***
3	-1.5711	-5.3620	***	-3.3042	***	-2.1106 **

Panel B: The rejection of America emergency economic stabilization act						
Event day	AR(%)	Traditional T-statistics		Cross-sectional T-statistics		Sign Test T-statistics
-1	0.0381	0.1274		0.1242		-0.4376
0	-1.0995	-3.6760	***	-2.2684	**	-2.4797 **
1	-2.0131	-6.7300	***	-4.0770	***	-3.6466 ***
2	1.3896	4.6457	***	3.6355	***	3.6466 ***
3	-1.6544	-5.5310	***	-5.0758	***	-4.8135 ***

Panel C: The announcements of negative interest rate policy in Japanese Banks				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.0139	0.0793	0.0861	-1.4434
0	1.1273	6.4235 ***	5.7160 ***	3.7528 ***
1	1.1640	6.6331 ***	4.9075 ***	4.6188 ***
2	-0.7727	-4.4034 ***	-5.5182 ***	-3.4641 ***
3	-0.0891	-0.5079	-0.5292	-0.2887

Regarding Taiwan unrelated events, Figure 5 expresses that even though the day of the “European debt crisis and Greece credit rating downgraded” on Dec. 16, 2009, “Russian financial crisis” on Dec. 1, 2014 and “the financial storm of Swiss France” on Nov. 15, 2015 are significantly negative. Table 5 shows that the negative abnormal returns only persist on the event days of the “European debt crisis and Greece credit rating downgraded” on Dec. 16, 2009 and “Russian financial crisis” on Dec. 1, 2014, and one days after the event days, the stock prices bounced. Even though the negative abnormal returns persist few days during the period “the financial storm of Swiss France”, the negative abnormal returns are not less than -0.35. The light market response results from the little relevance between Taiwan and the three European countries, Greece, Russia and Switzerland.

Table 5 Abnormal Returns of Events occurred in Taiwan Unrelated Countries (%)

Panel A: European debt and Greece credit rating downgraded				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.4767	1.4573	3.4588 ***	2.2361 **
0	-0.6109	-1.8677 *	-4.1952 ***	-4.3231 ***
1	0.2039	0.6234	1.5127	1.6398
2	-0.2255	-0.6893	-2.1153 **	-1.6398
3	-0.3687	-1.1273	-3.0489 ***	-3.4286 ***
Panel B: Russian crisis				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	0.0542	0.3916	0.8682	-0.4575
0	-0.6886	-4.9701 ***	-5.8637 ***	-4.4225 ***
1	0.4179	3.0162 ***	1.5764	0.4575
2	0.9588	6.9208 ***	3.6366 ***	1.0675
3	-0.0368	-0.2659	-0.2588	-0.1525
Panel C: The financial storm of Swiss France				
Event day	AR(%)	Traditional T-statistics	Cross-sectional T-statistics	Sign Test T-statistics
-1	-0.2275	-1.6035	-2.8735 ***	-1.4744
0	-0.2931	-2.0653 **	-2.4830 **	-2.9488 ***
1	-0.2912	-2.0524 **	-2.5202 **	-2.3591 **
2	-0.1720	-1.2121	-2.0070 **	-2.3591 **
3	-0.3448	-2.4303 **	-3.5362 ***	-2.3591 **

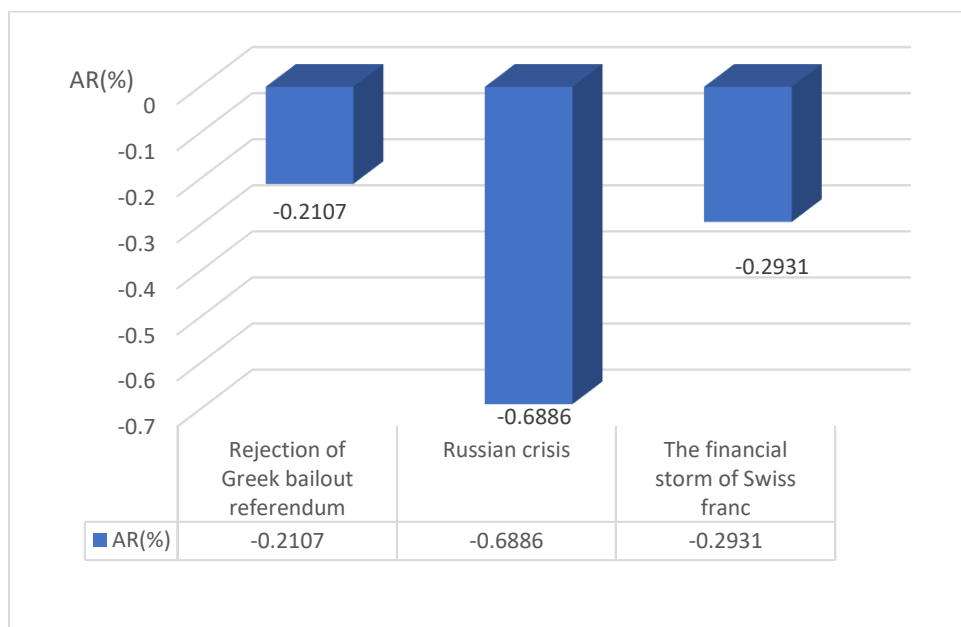


Figure 5 Abnormal Returns of Events Occurred in Taiwan Unrelated Countries (%) Results of

test: Figures 6 and 7 show that cumulative abnormal returns of financial crisis event and non-financial events, respectively. Among the absolute values of abnormal returns arising from major international events, the extent of market response to Lehman Brothers' bankruptcy event is most obvious. The results of ANOVA display that the abnormal return of financial crisis events is more significant than the abnormal returns of non-financial incidents in the financial industry. Our results support H3, the extent of financial contagion is greater for financial crisis events.

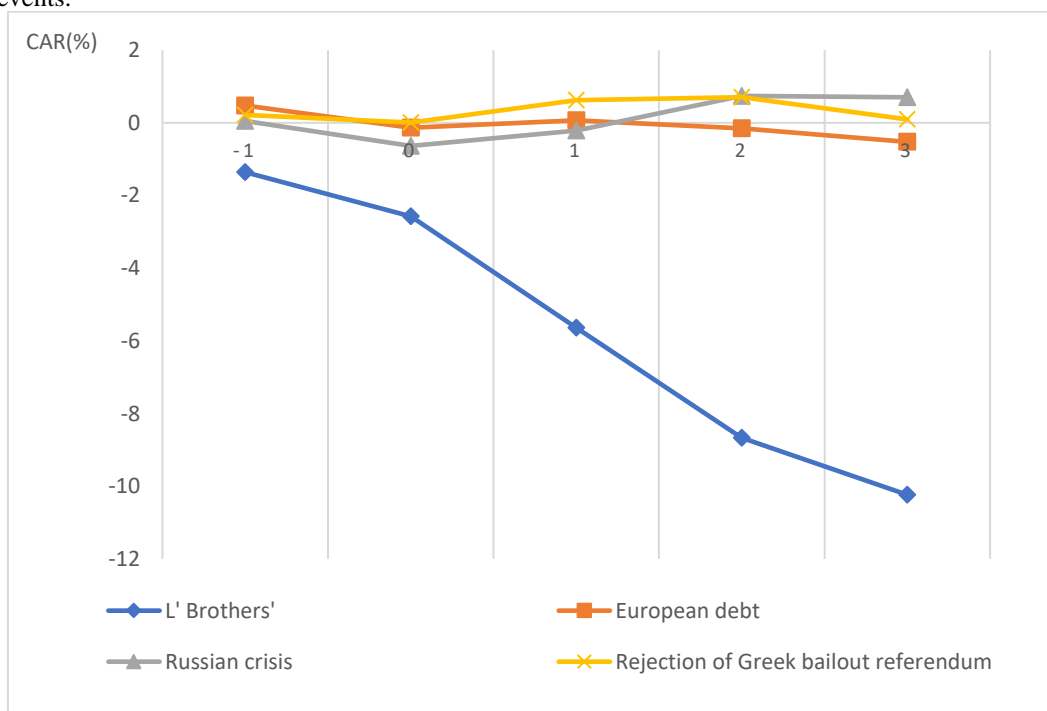


Figure 6 Cumulative Abnormal Returns of Financial Crisis Event (%)

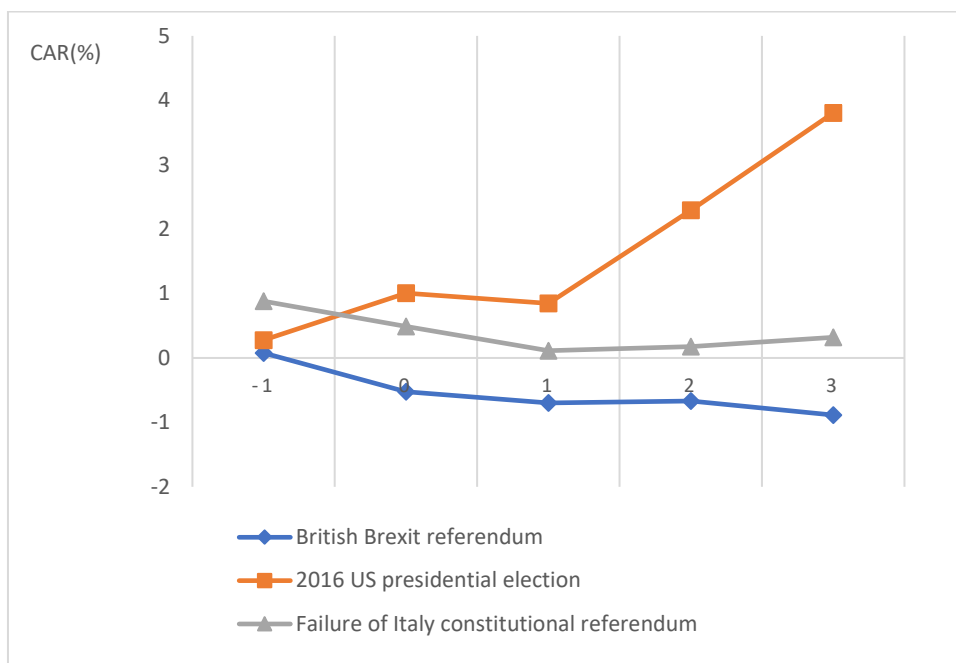


Figure 7 Cumulative Abnormal Returns of Non-Financial Crisis Event (%)

Figures 8 and 9 show that cumulative abnormal returns of Taiwan related event and unrelated events, respectively. The announcements of negative interest rate policy in Japanese Banks caused a certain short-term hot money flow into Taiwan and had impact on stock price rise since Tsai et al. (2014) pointed out that the entry of international financial institutions and foreign hot money into Taiwan may cause the Taiwan stock market and the foreign exchange market to grow at the same time. Among the absolute values of abnormal returns arising from major international events, the extent of market response to U.S. Lehman Brothers' bankruptcy event is most obvious. Since the U.S. is close to Taiwan, U.S. Lehman Brothers' bankruptcy event cause greatest response in the financial industry. The results of ANOVA analysis support H4, the extent of financial contagion is greater for international financial events caused by the Taiwan related countries than those occurred by other countries.

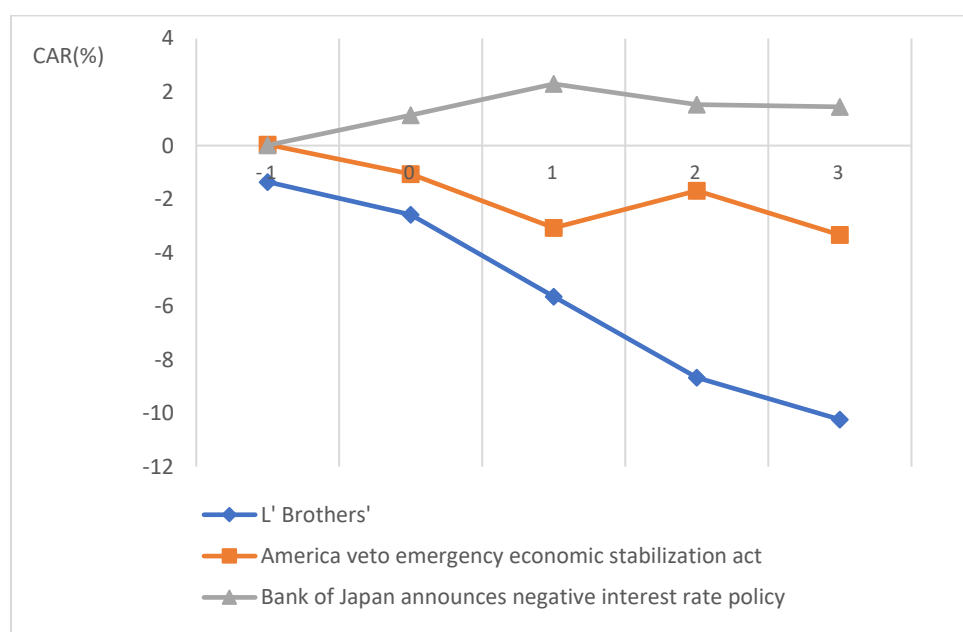


Figure 8 Cumulative Abnormal Returns (CARs) of Taiwan Related Events (%)

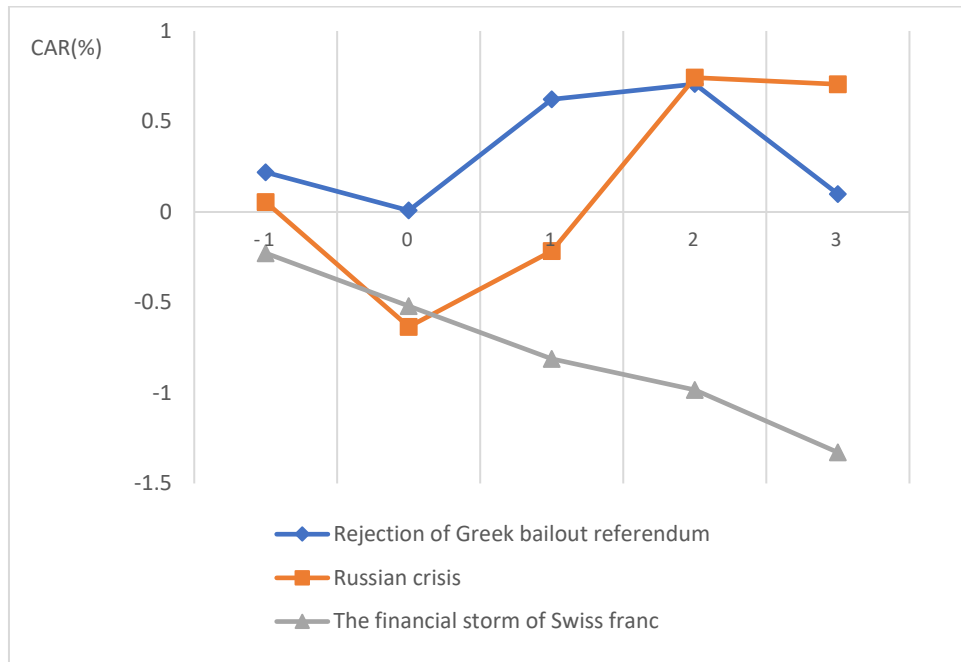


Figure 9 Cumulative Abnormal Returns (CARs) of Taiwan Unrelated Events (%)

VI. CONCLUSIONS

Based on the event day methodology, this paper explores whether the impact of major international events (financial, economic and political events) from 2008 to 2016 on the returns of Taiwan's financial industry. Our results show that during the period of major financial crisis events, the stock price of Taiwan's financial industry will generate abnormal returns, which suggests financial contagion theory. That is, a change in the price of one market will cause another market to be affected, which will result in greater abnormal returns to the stock market in Taiwan's financial industry. Moreover, our results find the market response to non-financial events in Taiwan's financial industry, supporting the herding behaviors of investors. Investors fear that they will be affected by major international storms and blindly follow market information to buy and sell financial stocks. This paper elaborates the influence of herding theory and financial contagion theory on the investment. In this paper, we use ANOVA to compare the abnormal returned caused by international financial crisis events with the abnormal returns caused by non-financial crisis events in the listed financial firms in Taiwan. ANOVA analysis results display the impact of international financial crisis events is larger than that of international non-financial crisis events in Taiwan's financial industry, which proves financial contagion theory. Furthermore, analysis of variance (ANOVA) is conducted to compare the market response between events occurred in Taiwan related countries and Taiwan unrelated countries. The results show that for Taiwan's financial industry, the market response to U.S. and Japan events is greater than the market response to events occurred in other countries, since Taiwan have continuously have closely trade associations with Japan and U.S.

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