The Effect of China-U.S. Trade Dispute on Chinese Stock Market: New Evidence from the Event Study Analysis

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Abstract: In 2018, the China-U.S. trade dispute started, which brings heterogeneous impacts on the global economy. The purpose of this paper is to examine the effects of tariffs targeting Chinese exporting commodities imposed by the U.S. on the Chinese stock market by utilizing the event study analysis. 10 industries' stock returns between Jan. 3rd, 2017, and Apr. 3rd, 2020 were selected as the research objectives from the WIND database, according to the Chinese Shen Wan's classification standard. Results based on event study analysis show that: First, the China-U.S. trade dispute causes significant fluctuations to Chinese stock returns. Second, the impacts of the trade dispute are mainly negative, showing by the negative cumulative average abnormal returns in the export-oriented sectors when they are encountered with new tariffs imposed by the United States. However, the effects can also be positive because of the various situations of targeted industries, and the defensive measures taken by China. Third, the trade dispute also affects investors' views on the macro economy, in which the impact on the real economy can be transferred to other non-export-oriented industries, such as the banking sector. This study provides empirical evidence for China's policymakers to take measures in strengthening the independence of innovation, protecting intellectual property rights. Investors also need to equip themselves with more financial knowledge.

Keywords: trade dispute, the effect of tariffs, Chinese stock market, event study analysis, cumulative average abnormal returns

1. Introduction

From 2008 to 2018, the scale of the U.S. trade deficit to China increased from USD284.8480 billion to USD44.0550 billion, and the share of the U.S. deficit rose from 32.93% to 46.83%. Particularly, in 2018, from January to August, the trade deficit with China increased by 9.00%, accounting for 48.10% of the total increase in the U.S. trade deficit during the same period. The United States authorities insist that it has suffered "unfair" treatment in its international trade with China. With the increasing unemployment rate in the U.S., President Trump began to impose trade sanctions on China in March 2018, to enhance economic development and increase the employment rate in the United States. China was forced to take tariffs on imports from the U.S. as countermeasures and self-protection reactions. Thus, the China-U.S. trade dispute began.

Based on previous studies, the main reasons for the China-U.S. trade dispute have been focused on the following five aspects: 1) the deficit of bilateral trade; 2) taking restrictions on the Chinese companies to have access to American technology; 3) hindering the growth of the Chinese military; 4) reducing the federal budget deficit; 5) President Trump is worried about China can threaten the international standing of the United States[1-2]. On August 19, 2017, President Trump signed a memorandum instructing the Office of the United States Trade Representative (USTR) to conduct a "301 investigation" against China. This event with strong unilateralism became the fuse of the China-U.S. trade dispute. Based on the "301 investigation", the Trump administration announced that starting on March 22, 2018, high tariffs would be imposed on USD50-60 billion worth of products imported from China. China imposed retaliatory tariffs as a counterattack, after that, the two sides conducted multiple rounds of tariff confrontations. During this period, there have been many rounds of negotiations. However, these negotiations did not make any difference.

China and the U.S. together account for over 40% of the world GDP, thus the China-U.S. trade dispute has a huge spatial economic influence not only to both sides but also to the global trade. Utilizing the Global Trade Analysis Project (GTAP) and Computable General Equilibrium (CGE) model, Carvalho, Azevedo and Massuquetti[3] suggested that China

has a significant GDP loss of 1.20%, while the consequence is not symmetric since the U.S. lose only 0.30%. While various results are shown by different analysis methods, Itakura[4] employed a dynamic CGE model and indicated that the trade dispute causes 1.41% loss of GDP in China and 1.35% of that in the United States. In terms of the emerging countries, Teimouri and Raeissadat[5] found that the U.S. tariff on Chinese exports affects different sectors in ASEAN countries, since China accounts for over 50% share of imports and exports in such countries, and those countries that do not export-oriented are in a safer situation. As for some EU countries, Robert Basedow[6] argued that the trade dispute makes the global economy more fragile, puts more stress on the World Trade Organization (WTO), and has a higher possibility of the escalation of the geopolitical situation in the Middle East, which are all the risks for EU countries. However, the EU may have more cooperation with China, which can also protect the sectors of financial services, infrastructure, and manufacturing factories. Besides, Carvalho, Azevedo et al.[3] revealed that some important emerging countries which have comparative advantages can be benefited from the demand shift caused by the trade dispute.

The status of international trade can also affect the financial sector, such as the stock market. There is more and more literature analyzing the effects of trade policy on the stock market, which emphasizes that markets are linked to each other through various mechanisms. Egger and Zhu[7] indicated that the stock prices on both sides are affected by the China-U.S. trade dispute through global value chain linkages, and the third countries are also indirectly impacted during the trade dispute period. Besides, they also argued that the impacts are not always negative, it may be positive to some financial sectors. Utilizing a rational expectation framework and time-series analyses, Schneider, Troeger and Jena[8] suggested that the stock market primarily has negative reactions to the international crisis, they also proved that the stock market has a stronger reaction to conflictive events than cooperative ones. Combining the trade policy uncertainty and the exchange rate with the stock market, Huynh, Nasir and Nguyen[9] concluded that the spillover effect is asymmetric when there is trade policy uncertainty. Furthermore, the effect of trade policy uncertainty plays a significant role in the financial market. Chen and Chiang[10] constructed newspaper-based Equity Market Volatility trackers and found that the trade policy becomes the main factor in the financial market after the escalation of China-U.S. trade tensions, which means that the stock market is highly related to international trade. Also, utilizing the time-rolling window analysis, He et al.[11] tested the spillover effect from the impact of economic policy uncertainty (EPU) on the S&P 500 index, their study revealed the different level of connection between the EPU and the stock market, which implied that EPU has more impact on the good stock market fluctuations, compared with bad volatilities.

Also, in Figure 1, which shows that during the period of the China-U.S. trade dispute, the S&P 500 Index and the Shanghai Composite Index both have huge downside fluctuations, especially from March 2018. Though starting from May 2019, China and the United States conducted many times of negotiations with the increasing trend of the indexes. Meanwhile, all these negotiations did not have any substantial signs of progress, and the stock market is still full of fluctuations risks because of the uncertainty of trade policy. Thus, the China-U.S. trade dispute brings shocks to the financial market, which is the primary motive of this study to address the effect of the trade dispute on the stock market.
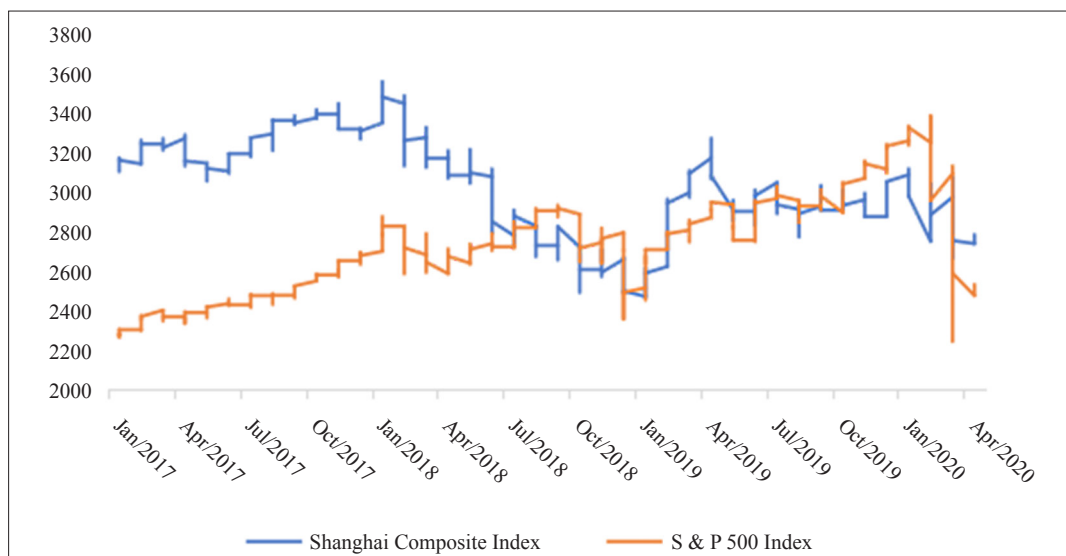

Figure 1. The fluctuation of the stock markets
Data source: Yahoo finance, https://finance.yahoo.com/

Previous studies primarily focused on the effects of the trade dispute on the exchange rate[12], the manufacturing industry[13], the general equilibrium[14], the shipping freight[15], and the health care[16]. To the best of our knowledge, there is little literature related to the trade dispute impacts on the stock market by being classified through the industrial-level. To fill the gap, this study aims to investigate the effects of the tariffs imposed by the U.S. on the Chinese stock market, only at the industries-level, by applying the method of event study analysis. It can also provide new perspectives on policy implications specific to the China-U.S. trade dispute.

The remainder of this paper is structured as follows. Section 2 is a literature review. Section 3 describes the data, introduces the method of event study analysis, and presents the summary of events. Section 4 reports the empirical results and robustness test adopted the Fama-French Three-Factors model. Section 5 offers conclusions and implications.

2. Literature review

2.1 Previous research on the trade dispute

The trade dispute between the two largest countries in the world has attracted the public's attention. Regarding the impact of the trade dispute, many researchers have done various empirical analyses on different aspects. Crowley, Meng and Song[17] investigated the connection between the tariffs and the firms' decisions to enter or exit from export markets, by using the Chinese customs transactions between 2000 and 2009. It is proved that the uncertainty of trade policy increases the possibility of firms to exit from established foreign markets, and the result also indicates that China could increase 2.00% of the international market per year without trade policy uncertainty. Utilizing a multi-country global general equilibrium (GE) model, Li, He, and Lin[18] suggested that even China is significantly hurt by the trade dispute, these negative impacts are affordable. However, the retaliation tariffs from China also make the U.S. loss. Valta[19] argued that an intensification of product market competition among firms can significantly increase the cost of bank loans. Establishing a numerical global general equilibrium model, Li and Whalley[13] revealed that although the protection measures taken by the U.S. can reduce the imports from China, it will increase the unemployment rate in the United States. Carvalho, Azevedo et al.[3] also proved that social welfare decreases on both sides, by using the GTAP model. It was also indicated that trade protectionism can reduce the trade deficit in the United States. Utilizing the event study method, Egger and Zhu[7] suggested that protectionist tariffs hurt the firms in the acting country, except that, the third countries would also be infected. Also, Xu and Lien[12] combined a generalized autoregressive score-driving (GAS) model with the copula approach to analyze the dynamic dependencies of the Chinese Yuan (CNY) and the currencies of its major trade partners, which found that the trade conflict plays significant roles in the independence of the domestic currency. Utilizing the canonical GTAP in the GAMS model, Li, Balistreri et al.[14] found that the tariff imposed in March 2020 caused a 1.70% decrease in welfare in China and a 0.20% decrease in the United States. Wu[20] addressed that the trade dispute inevitably harms the health-care industry since there are restrictions not only on medical technology but also on Chinese students who study biotechnology and advanced medical care in the United States.

However, trade dispute not only causes negative effects but also becomes the catalyst for promoting the development of the economy. Fusacchia[21] investigated the trade war impacts on the EU countries through a computable general equilibrium model, which implied that EU countries increase their cooperation and linkages with the U.S., because of the China-U.S. trade conflicts. Meanwhile, Carvalho, Azevedo et al.[3] suggested that some emerging countries may benefit from the trade dispute since the market shift brings them competitive advantages. Utilizing a dynamic model, Lechthaler and Mileva[22] analyzed the distributional consequences of protectionism, which proved that the unskilled-intensive import-competing sector will be benefited during the trade war, so do unskilled workers.

2.2 Previous research on stock market fluctuation

Many researchers have already evaluated the possible elements causing the volatility of the stock price. Favero and Tamoni[23] used the Generalized Method of Moments (GMM) and Dynamic Dividend Growth Model to find that demographics plays significant roles in the stock market fluctuation, especially, the ratio of middle-aged to young adults does well in forecasting the stock market returns, in the long run, it can also account the stock market risk which has steeply downward-sloping term structure. The data from the Survey of Consumer Finances was employed by Bilias et al.[24] to show that household characteristics significantly affect the incidence of trade and the stock trading patterns, which are highly related to the stock market fluctuation. The policy plays a role in the stock market fluctuation, as revealed by Zhang et al.[25], who applied vector auto-regressive (VAR) models to the Chinese stock market from 2005 to 2012. This study suggested that monetary shocks have wealth effect and liquidity effect on the intertemporal volatility of stock pricing. Other shocks can also highly affect the stock market. Abdalla[26] adopted a bi-variate vector autoregressive-generalized

autoregressive conditional heteroscedasticity model to the empirical data from Sudan, indicating that the oil shocks and exchange rate fluctuations cause great fluctuations of KSE index. It was also proved that investors' memory is highly related to the stock price. The research conducted by Chow and Liu[27] through the present value model with a constant discount rate, indicated that there is memory in the duration of dividend fluctuations, which generates a spurious bias in the stock price. This study also emphasized that the spurious bias can be more server with stronger memory, which induces excessive volatility in the stock price. News is one of the elements affecting the stock market, which cannot be ignored. It was found that public perceptions have long-term effects on the stock market by employing the wavelet-based copula approach in the U.S. stock market, which indicated that public news plays an important role in the investment strategy[28]. Salisu and Vo[16] collected data from the top-20 worst-hit countries, combined with the COVID-19 pandemic, which revealed that health news can also be a good predictor for the change of stock returns. What's more, financial derivatives can affect the stock returns, as found by Wang, Han, Huang and Yost-Bremm[29], which implied that information in currency forward rates works in the predictability of the firm stock returns worldwide. In general, the factors which can bring new information to the stock market play roles in the volatility of the stock market.

2.3 Previous research on the impact of the trade dispute on the stock market

There are many new empirical investigations about the various impacts brought by the trade dispute on the stock market. The equity markets are highly related to the international trade policy uncertainty (TPU), He, Lucey et al.[11] employed a time-varying VAR model (TVP-SV-VAR) both in the U.S. and Chinese stock markets, to find that the effects are heterogeneous since the trade conflict positively affects the U.S. stock market while it has negative effects on Chinese stock market. The sensitivity of the stock market between the two sides of the trade dispute can be different, it also has a spillover effect on other sectors, which is proved by the study conducted by Gong, Li et al.[15], who applied the dynamic tri-variate Markov regime-switching (MRS) copula model and set an ARMA-GARCH model to examine contagion risk, indicating that the U.S. stock market shows more sensitive reactions to the new tariffs, the fluctuations have spillover effects which can infect the shipping freight market. The spillover effect is also emphasized by the survey from Li, Zhuang, Wang and Zhang[30]. In this study, the complex network methods, the GARCH-BEKK model, and the Planar Maximum Filter Graph (PMFG) algorithm were applied, with building a stock market index by the principal component analysis method, to indicate that there exists risk spillover effect in the stock market, whose impact increases with the increasing intensity of trade friction incidents. Their study also revealed four indicators that cause abnormal fluctuations in China's stock market during the trade dispute. Different kinds of firms also have various reactions to trade dispute. Wang, Wang, Zhong and Yao[31] used the Chinese firms' stock returns with studying the financial market reactions of the China-US trade dispute to find that firms more dependent on exporting have higher variance in stock returns, especially some private firms. It was also revealed by Levine and Schmukler[32], whose study indicated that stock liquidity is related to the firms' level of internationalization, which proved that the export-oriented firms undergoing higher volatility of their stock returns decrease the domestic stock market liquidity. The trade dispute brings volatility to the stock market, and however, the effects may be heterogeneous in various sectors. Thus, based on prior studies, this study puts forward the following hypotheses:

Hypothesis 1 (H1): Each announcement of the tariff will cause the variation of stock returns, showing by the cumulative average abnormal returns will be significantly different from zero through the event study analysis.

Hypothesis 2 (H2): For the export-oriented sectors, which will mainly have negative reactions to the new tariffs imposed on them, by showing that the cumulative average abnormal returns are mainly negative. However, the effects of tariffs can be heterogeneous according to the various situations of targeted sectors.

Hypothesis 3 (H3): The effects of the trade dispute can be transferred from the real economy to other non-export-oriented sectors, such as the banking sector.

3. Data and methodology

3.1 Data

The dataset in this study is from the WIND database[33], which is a leading financial company for financial data, information, and software service in China. Regarding the impact of the trade dispute on the stock market, this study chose the sectors which are the tariff-targeted sectors and used the banking sector for investigating the spillover effect of the stock market. When selecting the targeted sectors for this study, the Chinese Shen Wan's classification standard was applied. The sectors in this study are Steel, Metals, Automobile, Textile, Bank, Aerospace, Transportation, Commercial trade, Real estate, and IT. When rearranging the data, the special treatment shares (ST shares), the foreign shares (B shares), and all the stocks that were suspended during the estimation period in Chinese stock market were all removed. Table 1 presents

the results of the descriptive statistics.

Table 1. Descriptive statistics

Sector	Obs.	Mean	Std. Dev.	Min	Max
Aerospace	24	86.5228	0.4525	11.5166	347.9782
Automobile	169	226.4473	5.7423	2.7015	40825.8987
Bank	24	86.6623	1.8785	4.2325	1879.8975
Commercial Trade	83	98.7362	0.9124	5.5954	2276.3484
Iron	31	25.9661	0.1543	1.6283	196.2889
IT	207	114.5302	0.7512	7.1126	5894.8914
Metals	114	73.5324	0.5007	2.5636	2394.0765
Real Estate	128	123.3213	1.1705	2.6435	5647.1457
Textile	79	35.4783	0.1145	3.3873	402.0814
Transportation	113	70.0324	1.0035	1.9901	4204.2924

Source: WIND database, https://www.wind.com.cn/NewSite/edb.html

3.2 Methodology

This study mainly employs the event study analysis to explore the impacts of specific tariffs on the stock returns in industrial-level, and to test the spillover effect of the stock market through analyzing the fluctuation in the internal sectors, such as the banking sector.

In terms of the event study analysis, Brown and Warner[34], and Fama[35] divided the event study analysis into short-term event analysis and long-term event analysis. In the field of corporate finance, the short-term event study method (Dailey Event Study) provides good measurements for exploring the impact of an event on the company's stock returns. In detail, Cumulative Abnormal Returns (*CARs*) are mainly used for single stock returns analysis, and Cumulative Average Abnormal Returns (*CAARs*) are applied for portfolio analysis. In this study, *CAARs* are employed since the analysis is based on the industrial-level. If the *CAARs* are significantly less than zero, it reveals that the trade dispute is negative to the volatility of the stock returns. Otherwise, such industry benefits from the announcement of the tariff to some extent, in short term.

Before calculations, according to the estimation methods from MacKinlay[36], the event date, the event window, and the estimation window need to be defined. Considering the current technology which brings the high-speed propagation of information, in this study, the event window is set as the threshold of (-1, +1), and 17 event dates are defined as t = 0. In this threshold, -1 represents one day before the event, and +1 stands for one day after the event. The *CAARs* will be calculated in this threshold, and then, a significance test will be applied to *CAARs*. Notably, if the event date is when the stock market is closed, the time t = 0 is automatically deferred to the first day of the market opening. Additionally, regarding the estimation window which is used to calculate the expected stock returns, the common length of the estimation window is approximate 100 days to 300 days. In this study, the threshold of the estimation window is set from January 3, 2017, to December 29, 2017, with a total of 244 trading days. The estimation window has no impact from the trade dispute, combined with the fact that firms in each sector did not undergo large changes in this year, and thus, the expected returns are consistent and can be estimated precisely.

There are many models for estimating the expected returns, such as the Market Model, Market-adjusted Model, Fama-French Three-Factor Model, Carhart Four-Factor Model (Fama-French plus Momentum), and the Hidden Markov Model (HMM), different models have their pros and cons with various application conditions. Considering the situation of the Chinese stock market and previous literature, Market Model is used to estimate abnormal returns with high efficiency. Therefore, the Market Model is employed for the expected return estimation. The formula of the Market Model is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \ t = t_1, \ldots, t_N, \ i = 1, 2, \ldots, N \qquad (1)$$

$R_{i,t}$, $R_{m,t}$ are the returns of stock i and market portfolio on date t, respectively, α_i, β_i are the estimated coefficients, and ε_{it} is the error term. The comprehensive A-share market daily return including the cash dividend reinvestment (weighted market capitalization) is used as the market portfolio return ($R_{m,t}$) in the Chinese stock market.

The abnormal returns (*ARs*) can be expressed as:

$$ARs_{i,t} = R_i - (\alpha_i + \beta_i R_{mt}) \tag{2}$$

After getting the *ARs*, average abnormal returns (*AARs*) can be calculated, and then, the formula of the cumulative average abnormal returns (*CAARs*) is as follows:

$$CAARs_i\,(t_1,\,t_2) = \sum_{t=t_1}^{t_2} AAR_{i,t} \tag{3}$$

Besides, it is necessary to test whether the *CAARs* for each sector is significantly different from 0, which implies whether the tariffs have significant impacts on the stock returns. This study utilizes Stata software, mainly using the *eventstudy2* package to conduct the event study analysis.

3.3. The summary of events

This study is mainly focused on the effects of the tariffs imposed by the U.S. on the Chinese export market, and thus the major events that the U.S. announced the tariffs to China are present in Table 2, and there are 17 events between 2018 and the beginning of 2020.

Table 2. The summary of events

Event	Date	The Main Topic
1	March 22, 2018	President Trump asked the United States Trade Representative (USTR) to investigate applying tariffs on USD50-60 billion worth of Chinese goods[37].
2	April 5, 2018	President Trump said that he was considering another round of tariffs on an additional USD100 billion of Chinese imports as Beijing retaliates[38].
3	May 29, 2018	The White House announced that it would impose a 25% tariff on USD50 billion of Chinese goods with "industrially significant technology"[39].
4	June 16, 2018	President Trump declared that the United States would impose a 25% tariff on USD50 billion of Chinese exports. USD34 billion would start on July 6, 2018, with a further USD16 billion to begin later[40].
5	July 6, 2018	American tariffs on USD34 billion of Chinese goods came into effect[41].
6	July 10, 2018	The U.S. released an initial list of the additional USD200 billion of Chinese goods that would be subject to a 10% tariff[42].
7	August 8, 2018	The Office of USTR published its finalized list of 279 Chinese goods, worth USD16 billion, to be subject to a 25% tariff from August 23[43].
8	August 23, 2018	The U.S. and China's promised tariffs on USD16 billion of goods took effect, and the tariff would be effective on August, 23[44].
9	September 18, 2018	The U.S. announced its 10% tariff on USD200 billion worth of Chinese goods[45].
		From December 2018 to May 2019, China and the United States are in the negotiation stage.
10	May 6, 2019	President Trump stated that the previous tariffs of 10% levied on USD200 billion worth of Chinese goods would be raised to 25% on May 10[46].
11	May 10, 2019	The U.S. raised the tariffs imposed on Chinese goods exported to the US USD200 billion from 10% to 25%[46].
12	August 1, 2019	President Trump announced on Twitter that an additional 10% tariff would be levied on the "remaining USD300 billion of goods".
13	August 15, 2019	The U.S. Trade Representative Office announced that it will impose a 10% tariff on approximately U.S. USD300 billion of imported goods from China from September 1[47].
14	August 17, 2019	The U.S. Trade Representative's Office announced that it would waive the 10% tariffs imposed on 44 Chinese products, including some furniture, baby products, Internet modems and routers, some chemical raw materials, and religious books, involving Chinese goods worth about USD7.8 billion[48].
15	August 23, 2019	President Trump said through Twitter that the United States would increase the existing additional tariffs on the U.S. USD250 billion of Chinese goods from 25% to 30% on October 1; it would take effect on September 1. Tariffs on another USD300 billion of Chinese goods would rise from 10% to 15% of the original plan[49].
16	September 4, 2019	The U.S. Department of Commerce made a preliminary ruling and decided to impose anti-dumping duties of up to 141% and 31% on structural steel exported to the U.S. from China and Mexico worth more than USD1 billion[50].
17	September 17, 2019	The Office of the United States Trade Representative announced that about 437 items of various types of instruments and equipment, organic synthetic materials, daily necessities, chemicals, textiles, electromechanical equipment, chemical products, steel products, etc. that originated in China exemption from additional tariffs[51].

4. Empirical results

4.1 The effect of China-U.S. trade dispute on the targeted industries

Results are presented in Table 3, based on the estimation of the event study analysis. In event 1, Metals, Aerospace, and Commercial trade all have significant changes of *CAARs* at a 1% confidence interval, the *CAARs* in Transportation, and Real estate sectors have significant changes at a 5% confidence interval, and the *CAARs* of IT is significant at a 10% confidence interval. However, it is interesting that in the first event, almost all fluctuations of stock returns are positive, the first tariff announcement causes a small increase in stock returns instead of a substantial reduction in the stock market of tariff-targeted sectors.

In terms of the Australian government's report[52], imposing tariffs may have heterogeneous effects on an economy. The net impact depends on several factors including whether the country has any market power in the world market and whether targeted countries take retaliation measures. The small positive reaction in China's stock market can be explained by these reasons: Firstly, Ministry of Commerce of the People's Republic of China immediately issued countermeasures that would impose tariffs on some products imported from the U.S. to balance the losses caused to China by the tariff imposed from the U.S. The retaliation measures include tariffs on USD3 billion of US-made fruits, pork, wine, steel pipes, and more than 100 other commodities. China's rapid countermeasures show that it can cope with the trade dispute, which give a positive signal to the Chinese market. Secondly, there is a period between the tariff announcement and effectiveness, U.S. import-oriented companies with the potential cost increasing problem will increase orders before the effective time. The increased orders may also stimulate the positive variation of stock returns. Thirdly, according to industry analysis reports and government reports, metals, aerospace, transportation, commercial trade, and real estate industries all have promising development inertia before the trade dispute. In 2017, China's total non-ferrous metal import and export trade (including gold jewelry and parts trade) was USD134.83 billion, an increase of 15.10% compared to the last year[53]. The period between 2012 and 2018 is the expansion and upgrading stage of China's aerospace industry[54]. China's international trade in 2017 is still in a promising situation, the value-added of domestic trade exceeded 10 trillion Yuan[55]. In 2017, China's railways, highways, and civil aviation are in an increasing stage, and the transportation sector has a strong growth rate[56]. In terms of the real estate industry, in 2017, the total price and median value of real estate suites at various levels in various cities have increased[57]. There is a shortage of talent in the IT industry and great potential for its development[58]. Therefore, in the first half of 2018, the tariff has little negative impacts on the stock market. Based on the above analysis, the strong domestic economy and the government's active counterattack give the market a stable signal, even though the *CAARs* are not negative, many of them are statistically significant, which is corresponding to H1.

However, the good times are not long. on April 5, 2018 (Event 2), the Office of the U.S. Trade Representative imposed additional tariffs on USD100 billion on Chinese imports, mainly involved information and communication technology, aerospace, IT, and medicine industries. Since April 5 is the Qingming Festival in China, the stock market is closed, so the event time is automatically deferred to April 9, which is the first workday after the second announcement of the tariff dispute news. The results show that the market begins to show significantly negative reactions, the *CAARs* (except for the banking and iron industry) within the event window are all negative, which indicates that the market starts to have pessimistic reactions to the China-U.S. trade dispute. However, the *CAARs* of the iron industry are not significant, and the reason is that the steel tariffs imposed by the U.S. do not only target China. Meanwhile, China has an extensive international steel-exporting market and is continuously exporting steel to developing countries during the construction of the Belt and Road Initiative. Thus, the impacts on the steel industry are relatively small and insignificant. Similar significantly negative *CAARs* are got from May 29, 2018 (Event 3) to September 18, 2018 (Event 9). During this period, the scale of the U.S. tariffs on China rose to USD200 billion, the intensity of the trade dispute soared, and the reactions of the Chinese stock market became more sensitive. Tariffs generally imposed by the U.S. on Chinese export commodities have a wide-ranging negative impact on the 10 industries stock returns. Thus, the results primarily follow H2.

On May 6, 2019 (Event 10), President Trump increased the tariffs imposed on USD200 billion of Chinese exports to the U.S. from 10% to 25%. It is negative news, but the empirical results of event study analysis show that *CAARs* in most industries are positive and significant. The reason is that before this event, China and the U.S. were in the negotiation stage, which gave the economy a breather opportunity. The market already prepared for the next tariff, so even when President Trump raised the tariff to the same category of goods again on May 6, the market did not have a negative reaction as before. In the following events (event 11 to 17), China and the United States experienced the third and fourth rounds of increases in tariffs, most of these industries show negative reactions to the events. In sum, the trade dispute has negative impacts on the Chinese stock market. Thus, the result is consistent with H1 and H2.

4.2 The effect of China-U.S. trade dispute on the banking sector

The banking sector was selected to explore the spillover effect of the stock market regarding the impacts of the China-U.S. trade dispute. The significance of the *CAARs* of the banking sector in different events indicates that the trade dispute not only affects investors' expectations to the tariff-targeted industries but also plays roles in the investors' views on the macro economy, with the effect spreading from the international real economic sectors to the internal financial sectors.

According to the empirical analysis, except for the insignificant *CAARs*, most *CAARs* of the banking sector are significantly less than 0, while there still have 5 *CAARs* which are significantly greater than 0. In Table 3, starting from May 10, 2019 (event 11), the reactions of the banking sector to the trade dispute are mainly negative, The positive *CAARs* in the banking sector at the early stage of the trade dispute mainly because at that time, China was in the period of economic transformation for promoting the development of the small-and-medium-sized enterprises (SMEs) and the real economy. Commercial banks gave loans to objective SMEs, which obtained funds to expand their scale and development, which enhanced their ability to defend the trade dispute, and in turn, the banking sector made profits by such lending. Meanwhile, the correct defensive reactions and protective measures taken by the banking sector to the trade dispute made the initial losses smaller or even gained some profits from the event. The positive responses in the banking sector are also corresponding to the fact that other sectors had positive *CAARs* instead of the negative fluctuations in the early period of the trade dispute.

However, from May 2019, the China-U.S. trade dispute entered the third round, the impact of trade friction became more profound, and the banking sector was also badly infected, showing that the *CAARs* are significantly less than zero. Therefore, the increase in tariffs imposed by the United States on China can indirectly spread to banking sectors, which is consistent with the H3.

Table 3. The results of the event study analysis on the 10 industries (based on the Market model)

Event	Iron	Metals	Automobile	Textile	Bank	Aerospace	Transportation	Commercial trade	Real estate	IT
1	-0.0140 (-1.6341)	0.0202*** (3.7166)	-0.0012 (-0.2819)	0.0070 (0.9871)	-0.0081 (-1.5181)	0.0651*** (3.7975)	0.0105** (1.9980)	0.0402*** (5.8484)	0.0097** (2.1354)	0.0095* (1.7817)
2	0.0049 (0.6899)	-0.0066** (-2.1875)	-0.0097*** (-2.6911)	-0.0127*** (-4.0835)	0.0177*** (6.2131)	-0.0313*** (-4.0268)	-0.0125*** (-3.4707)	-0.0149*** (-5.0055)	-0.0065*** (-2.7283)	-0.0395*** (-9.3773)
3	0.0196*** (2.6032)	0.0060 (1.2962)	-0.0329*** (-6.8079)	0.0182** (2.1316)	-0.0070** (-2.2924)	-0.0263*** (-3.0399)	-0.0052 (-0.9800)	0.0056 (1.2214)	-0.0099** (2.5721)	-0.0102** (-2.4224)
4	0.0362*** (3.2222)	-0.0288*** (-3.8853)	-0.0320*** (-7.0257)	-0.0363*** (-4.6900)	0.0102** (2.3750)	-0.0041 (-0.4312)	-0.0245*** (-6.1237)	-0.0295*** (-6.7781)	-0.0132** (-2.5825)	-0.0255*** (-6.3430)
5	-0.0291*** (-6.8695)	-0.0405*** (-14.0075)	-0.0308*** (-11.6477)	-0.0309*** (-9.8004)	0.0167** (2.6622)	-0.0228*** (-4.0233)	-0.0369*** (-9.7694)	-0.0278*** (-6.7754)	-0.0316*** (-8.2998)	-0.0185*** (-7.8203)
6	0.0045 (0.7848)	-0.0110*** (-2.6801)	-0.0145*** (-4.6650)	-0.0068* (-1.6792)	0.0031 (0.8327)	-0.0304*** (-4.4937)	-0.0148*** (-4.9161)	-0.0101*** (-2.8684)	-0.0110*** (-4.0024)	-0.0349*** (-11.6191)
7	-0.0092 (-1.4989)	-0.0206*** (-5.0556)	-0.0276*** (-11.0515)	-0.0295*** (-4.3261)	-0.0030 (-0.9999)	-0.0293*** (-4.1992)	-0.0161*** (-5.1638)	-0.0137*** (-3.4896)	-0.0730*** (-3.1842)	-0.0021 (-0.6617)
8	-0.0182** (-2.6874)	-0.0095*** (-3.3802)	-0.0021 (-0.7056)	-0.0028 (-0.7537)	0.0233*** (6.9321)	-0.0029 (-0.6425)	0.0070* (1.7496)	0.0007* (1.7496)	-0.0007 (-0.3145)	0.0048 (1.5902)
9	-0.0415*** (-4.1811)	-0.0267*** (-10.9767)	-0.0280*** (-10.2455)	-0.0197*** (-4.3903)	-0.0033 (-1.3068)	-0.0082 (-0.6924)	-0.0047 (-1.2708)	-0.0060** (-2.1392)	0.0024 (1.2328)	-0.0160*** (-6.7611)
10	0.0442*** (5.7747)	0.0236*** (4.2209)	0.0175*** (3.3649)	0.0196*** (2.9242)	0.0099 (1.3177)	0.0169* (1.9303)	0.01355** (2.0464)	0.0377*** (5.3074)	0.0157** (2.6081)	-0.0026 (-0.4741)
11	-0.0058 (-0.9193)	0.0044 (1.0651)	0.0115*** (3.0310)	0.0257*** (4.8180)	-0.0152*** (-5.1269)	0.0359*** (5.4584)	0.0176*** (4.3420)	0.0159*** (3.1991)	0.0105*** (3.3196)	0.0307*** (10.9133)
12	0.0186*** (4.8446)	0.0436*** (8.1432)	0.0123*** (4.8386)	0.0106*** (2.8491)	-0.0055* (-1.7684)	0.0172*** (3.8283)	0.0064** (2.1667)	0.0167*** (5.5677)	-0.0097*** (-3.3626)	0.0250*** (9.0523)
13	-0.0148*** (-6.5085)	-0.0175*** (-5.5105)	-0.00076*** (-3.4546)	-0.0058* (-1.9645)	-0.0140*** (-7.8528)	-0.0032 (-0.5214)	-0.0092*** (-3.2058)	-0.0005 (0.2206)	-0.0037 (-1.3990)	0.0073*** (9.0523)
14	-0.0255*** (-6.7944)	-0.0061* (-1.7496)	-0.0045 (1.5742)	-0.0043 (-1.3110)	-0.0188*** (-7.2604)	0.0112 (1.1899)	0.0030 (0.8727)	0.0005 (0.1577)	0.0080*** (2.9200)	0.0203*** (6.1273)
15	-0.0077*** (-2.8775)	0.0080** (2.1947)	0.0202*** (4.9626)	-0.0034 (-0.9586)	-0.0041** (-2.2194)	0.0205*** (4.1744)	-0.0006 (-0.1417)	0.0081 (1.5569)	-0.0048 (-1.2216)	-0.0015 (-0.6462)
16	-0.0135*** (-4.3823)	-0.0088*** (-2.7789)	-0.0230*** (-7.6547)	-0.0092*** (-2.4786)	0.0139*** (5.7554)	-0.0400*** (-6.7766)	-0.0073*** (-2.7233)	-0.0025 (-0.6417)	0.0050* (1.9709)	0.0010*** (2.8588)
17	0.0005 (0.1635)	-0.0041 (-1.3716)	0.0061* (1.8494)	0.0159*** (3.5734)	-0.0093*** (-6.5840)	-0.0171*** (-3.2351)	0.0034 (1.3038)	0.0044 (1.2973)	0.0034 (1.4376)	0.0082*** (2.7746)

Notes: ***, **, and * represent 1%, 5%, and 10% significance level, respectively, and the data in parentheses are the T-value of non-parametric tests*

4.3 Robustness test

To examine the robustness of the estimates, this study replaced the Market Model with the Fama-French Three-Factor Model, considering the size of firms, to calculate the expected stock returns and *CAARs*.

Specifically, the model can be expressed as:

$$E(R_{i,t}) - R_f = a_i + \beta_i(E(R_{mt}) - R_f) + s_i SMB_t + h_i HML_t + \varepsilon_{i,t} \qquad (4)$$

The three-factor model indicates that the expected excess return of the portfolio ($E(R_{i,t}) - R_f$), is mainly due to the premium of the market portfolio ($E(R_{i,t}) - R_f$), the return of the stock portfolio with different market value (measured by SMB_t), and the return of the book-to-market ratio (HML_t).

The data of SMB_t and HML_t are from the database named Resset. Table 4 presents the estimation results, showing that the tariffs have mainly brought negative effects on the 10 industries. With the escalation of the trade dispute, the negative impacts are increasing, which can be proved by the phenomenon that more and more industries have negative *CAARs*. The

banking industry is also affected in the trade dispute, with significant *CAARs*. The robust results reported in Table 4 imply that the non-parametric test still supports the hypotheses in this study.

Table 4. Robustness check (based on the Fama-French three factors model)

Event	Iron	Metals	Automobile	Textile	Bank	Aerospace	Transportation	Commercial trade	Real estate	IT
1	0.0245**	0.0608***	0.0428***	0.0511***	0.0454***	0.1051***	0.0534***	0.0834***	0.0541***	0.0532***
	(2.6968)	(9.7122)	(9.4347)	(7.2534)	(7.8929)	(6.2644)	(10.5811)	(12.0795)	(12.5991)	(10.0073)
2	-0.0067	-0.0111***	-0.0092**	-0.0110***	0.0040	-0.0298***	-0.0180***	-0.0150***	-0.0124***	-0.0282***
	(-0.9576)	(-3.6985)	(-2.5712)	(-3.2543)	(1.4518)	(-3.7609)	(-5.1098)	(-4.8997)	(-5.2442)	(-7.4009)
3	0.0700***	0.0558***	0.0156***	0.0635***	0.0298***	0.0206**	0.0428***	0.0527***	0.0355***	0.0372***
	(9.2981)	(11.5619)	(3.2586)	(7.9703)	(8.4076)	(2.1051)	(8.8806)	(12.0305)	(9.1822)	(8.7693)
4	0.1135***	0.0530***	0.0513***	0.0446***	0.0584***	0.0765***	0.0545***	0.0503***	0.0580***	0.0618***
	(9.7022)	(6.7694)	(10.8118)	(5.6731)	(16.8052)	(6.5279)	(11.5110)	(11.5783)	(11.7092)	(14.6039)
5	-0.0263***	-0.0407***	-0.0349***	-0.0450***	-0.0007	-0.0234***	-0.0336***	-0.0310***	-0.0351***	-0.0267***
	(-4.6002)	(-14.2260)	(-13.6476)	(-11.1387)	(-0.1409)	(-3.6646)	(-10.4839)	(-7.4056)	(-9.2504)	(-10.5802)
6	0.0185***	-0.0067**	-0.0185***	-0.0128***	-0.0097***	-0.0320***	-0.0139***	-0.0137***	-0.0133***	-0.0450***
	(2.8119)	(-1.6752)	(-5.8312)	(-3.0424)	(-3.0888)	(-4.6189)	(-4.8112)	(-3.7417)	(-4.6165)	(-14.7237)
7	-0.0355***	-0.0443***	-0.0513***	-0.0530***	-0.0403***	-0.0449***	-0.0420***	-0.0374***	-0.0343***	-0.0227***
	(-5.5855)	(-10.8040)	(-20.2815)	(-7.8323)	(-19.4404)	(-7.4820)	(-14.5357)	(-9.3602)	(-15.9695)	(-7.2553)
8	-0.0199***	-0.0119***	-0.0039	-0.0041	0.0285***	-0.0050	0.0057	-0.0023	-0.0018	0.0024
	(-2.8933)	(-4.2298)	(-1.2978)	(-1.1323)	(8.3739)	(-1.1323)	(1.4296)	(-0.9958)	(-0.7592)	(0.7974)
9	-0.0201***	-0.0342***	-0.0373***	-0.0294***	-0.0223***	-0.0154	-0.0149***	-0.0153***	-0.0083***	-0.0251***
	(-5.3133)	(-13.9239)	(-14.0204)	(-6.5464)	(-11.6110)	(-1.2554)	(-3.9916)	(-5.5320)	(-4.3553)	(-10.7256)
10	-0.0339***	-0.0273***	-0.0201***	-0.0038	-0.0174***	0.0040	-0.0105***	-0.0136***	-0.1271***	-0.0046
	(-5.4040)	(-6.5326)	(-5.1454)	(-0.7386)	(-4.8507)	(0.6958)	(-2.3895)	(-2.8729)	(-4.1106)	(-1.5242)
11	0.0665***	0.0522***	0.0588***	0.0629***	0.0588***	0.0583***	0.0494***	0.0700***	0.0539***	0.0452***
	(8.3597)	(9.8736)	(11.3775)	(9.7398)	(8.7540)	(6.0734)	(7.4898)	(10.6549)	(9.4209)	(8.3522)
12	0.0467***	0.0585***	0.0196***	0.0166***	0.0298***	0.0226***	0.0223***	0.0250***	0.0090***	0.0196***
	(9.4150)	(11.0406)	(7.4119)	(4.0908)	(12.0953)	(5.1305)	(7.9474)	(8.3880)	(3.4572)	(7.2340)
13	-0.0079***	-0.0070***	-0.0285***	-0.0289***	-0.0281***	-0.0223***	-0.0201***	-0.0200***	-0.0150***	-0.0263***
	(-2.3253)	(-8.7087)	(-10.9665)	(-9.4839)	(-10.9477)	(-3.4417)	(-5.9063)	(-7.4240)	(-5.6586)	(-9.0933)
14	-0.0473***	-0.0372***	-0.0471***	-0.0418***	-0.0436***	-0.0238***	-0.0286***	-0.0350***	-0.0222***	-0.0236***
	(-13.5152)	(-10.0810)	(-13.1529)	(-11.2357)	(-15.9568)	(-2.5705)	(-7.6142)	(-9.8749)	(-8.1942)	(-6.7911)
15	0.0040	0.0116***	0.0196***	-0.0060	0.0041***	0.0190***	0.0030	0.0071	-0.0011	-0.0099***
	(1.6472)	(3.1216)	(4.5144)	(-1.5772)	(2.1853)	(3.6201)	(0.7438)	(1.3137)	(-0.2850)	(-4.1615)
16	-0.0327***	-0.0320***	-0.0487***	-0.0384***	-0.0065***	-0.0064***	-0.0390***	-0.0272***	-0.0179***	-0.0180***
	(-10.5758)	(-9.6184)	(-15.3506)	(-9.3083)	(-2.5867)	(-10.9823)	(-10.3260)	(-6.9513)	(-6.9950)	(-5.1378)
17	0.0330***	0.0106***	0.0090**	0.0161***	0.0123***	-0.0145**	0.0179***	0.0083**	0.0173***	-0.0042
	(9.1045)	(3.1558)	(2.4251)	(3.5065)	(7.6379)	(-2.4262)	(5.8059)	(2.3694)	(7.2232)	(-1.3289)

Notes: ***, **, and * represent 1%, 5%, and 10% significance level, respectively, and the data in parentheses are the T-value of non-parametric tests

5. Conclusions and implications

The trade dispute initiated by the United States has brought great uncertainty not only to both sides but also to the global economy. The escalating China-U.S. trade dispute hurts the tariff-targeted industries in China. Through the event study analysis and the empirical data from the Chinese stock market, conclusions can be made as follows: First, the China-U.S. trade dispute causes significant variation in Chinese stock returns, which is identical to H1. Second, the impacts of the trade dispute are negative, with negative *CAARs* showed in the export-oriented sectors when they are encountered with the new tariffs imposed by the U.S. However, some effects of tariffs are positive because of the various situations of targeted industries, and the defensive measures taken by China, which is as hypothesized in H2. Third, the trade dispute also affects the macroeconomic environment, in which the impact on the real economy is transferred to some other non-export-oriented industries. Thus, the result is consistent with H3.

Based on the conclusions, measures can be taken to reduce the negative effect of the trade dispute. First, policymakers should strengthen the independence of innovation and the development of the real economy. The prosperity of the real economy is the foundation of the overall economy. Innovation is the key to the development of the real economy in modern society. The Chinese government should improve the level of innovation and inject a strong driving force into China's economic transformation and industrial upgrading. Meanwhile, China should strengthen the protection of intellectual property rights to protect the legitimate rights and interests of Chinese enterprises. Second, China should promote multilateral trade and expand the international market. The development of the international market is conducive to the diversification of product export markets, which can reduce the reliance on one specific country's import demand. Under the China-U.S. trade dispute, establishing stable cooperative relations with other countries has become particularly important. For instance, the Belt and Road Initiative is a good opportunity for win-win cooperation with countries taking part in this activity. Third, investors should learn more about financial knowledge. Small investors in the Chinese stock market are fragile and susceptible to interference from outside, and they are more likely to be irrational when hearing some not good economic information. Thus, equipped with financial knowledge and making a proper investment decision is good for small investors to survive in uncertain shocks on the stock market.

Acknowledgments

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