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**Does the technology already become the main battleground of the trade conflicts
between China and the U.S.?**

In Partial Fulfillment of the Requirements
for the Bachelor of Science in Finance

By

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Abstract

The trade conflicts between China and US already influence various aspects such as agriculture, industry. This significant impact not only limited bilateral economy's development but also the world economy's development. In the past year, the conflicts didn't get solved and otherwise get worse. Both China and the U.S believed it has the key to lost less in the trade conflict. In the research, quantity method will be used to analyze the development over past decade in both countries and to make a prediction for the near future. This research will also discuss technology, which is the key in the trade conflicts to figure out why the U.S broke out the conflict and why China was so confident to react. What is the purpose of the U.S and whether China is strong enough to face the conflicts? All of the research will concentrate on the technology development of both countries.

Introduction

America and China are the two biggest economies in the world, and the trade war outbreak in 2018 rapidly influenced both countries in many different aspects such as agriculture, industry, and technology. Apparently, the trade has a negative effect on both the US and China. Hence, bilateral governments have negotiated several times but didn't get any curial results. Besides, technology conflicts are escalating to the highest level which already beyond other aspects. For example, the telecommunication technology competition like 5G is also an inevitable part of the trade war. This article will offer a hypothesis that the technology will be main battleground of the trade conflicts.

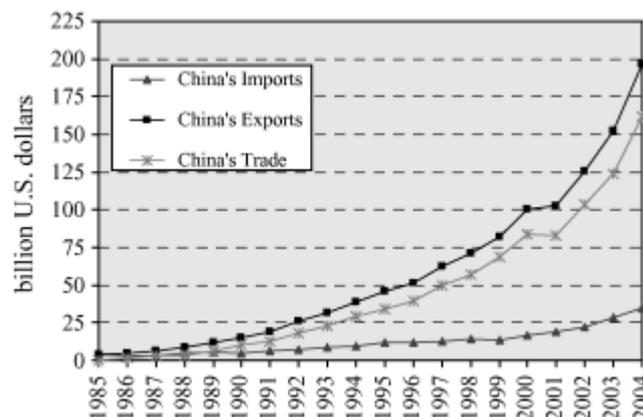
In order to test the hypothesis, in this research, I will collect some related historical data and primary compare them. First, I will collect three main indices in the market, as the consistence of three indices are different, these three indices have different emphasis, thus primarily compare those three indices I can find which fields are impacted heavily. In this paper, hypothesis is that technology especially 5G and AI is main battleground. Then, I will select some of companies that are taking the leading position in those field and compare their stock prices with other companies along the time line of trade war. Thus, I can primarily conclude that the technology is the significant battleground of this China-U.S. trade conflicts.

It is important to figure out this hypothesis because the war retards the development of China and US, which are two main economies in east and west,

also war has a huge impact to the worldwide economics. It also restricts China's future plan, which is the 'Belt and Road Initiative' and the 'Made in China 2025' programs to Beijing's realization of the 'Chinese dream'. In the past, the war or conflicts contains invasions, plunders, but in the new century, it usually fireless, including the destroy of the social order and the development potentials. Thus, figuring out the essence of the trade conflicts is really important. How important the role does the technology plays in the trade conflicts? Why both countries are confidence on the technologies? Lots of questions are further behind, hope this research will help you to explore more on the trade conflicts between China and the U.S. Moreover, 21st century belongs to technology, the country who owns better technology will dominate the future, at least become an important part in the world.

Literature review

The definition of trade war is one country uses taxes or quotas to limit another country's trade. It is common but the trade friction between China and U.S. broke out in 2018 shocked the world because they are two biggest economies nowadays. Started from agriculture and industry, trade-war directly hurt the business between two countries and have an impact on world business. The U.S. was willing to launch the trade war with sacrifice because it found a huge influence after China well developed. Tao Liu and Wing Thye Woo specify the reason in their article named Understanding the U.S.-China Trade War.



They offered two main reasons, first is the depression of job opportunities due to China's trade surplus and the other is the technology China's owned might weaken the national security and the international standing. (Tao Liu; Wing Thye Woo, 2018) Won W. Koo and Renan Zhuang used the exchange rate between U.S. dollars to figure out how China influenced U.S economic by using the error component two-stage least squares estimation method. (WON W. KOO; Renan Zhuang, 2007)

Also, the analysis of the trading data between China and the U.S. figured out where the U.S concerns came from and helped me to predict the future. Another article which is useful from Feng Dai, Ruixiang Liu and Shunfeng Song analyzed the unemployment in the U.S. in their article through a specific model that make the relationship between the input and output, also structural decomposition analysis method. (Feng Dai; Ruixiang Liu; Shunfeng Song, 2019) It is useful because the sample in their model is larger enough for researchers thus, I can analyze the changes in last decades, make a prediction in the future and testify whether the concern of U.S. is necessary.

However, the essence of trade war is no longer based on the money layer, it influences the development of two countries. The U.S. uses the trade war not only to protect domestic industries, but limited the rapidly increasing development of China. Nowadays, the country which owns technology is more possible to gain more. The U.S. also knows this as it controls the main technology for almost a century. Whatever Microsoft, Apple, Intel, they almost control the whole information systems and the internet. So, the article from Litao and Xiangru YIN indicates that technology is the battleground of the friction as the U.S are losing its technological edge to China. In order to deter China's overall plan, the U.S. started to take actions toward Chinese companies. (Litao Zhao; Xiangru YIN, 2019) Doctor E. Ofek and John Masko used HUAWEI as the example to demonstrate how the U.S. government limited the representative of Chinese technology company HUAWEI, and how HUAWEI fought back. (E.Ofek; John Masko, 2019) In a sense, the actions that the U.S used to HUAWEI also show its desire to limit China's development. Especially in the time that 5G comes out. Anthony W. Chen, Jim Chen and V. Reddy

Dondeti pointed out that how the U.S. prevent China to be a new superpower and the core of the trade war is actually about technology. (Anthony W. Chen; Jim Chen; V. Reddy Dondeti, 2019)

In conclusion, to what extend did the trade war influenced China, U.S., and the rest of the world still unsure, especially in the technology layer. For the business layer, Ahu Coşkun Özer used data and model to make a prediction, he compared the export data from China and the U.S. Based on the results of the analysis, Ahu found the linear relationship among China U.S. and the rest of the world. (Özer) Only when I figure out to what extend the trade war will influence the world both in economic and technology, the friction between China and the U.S. will be solved. This article will follow the same path of the literature review, demonstrate the economic influence in both China and U.S. as the basic, then concentrate more on the technology conflicts between China and the U.S.

Asvin Gohil, Hardik Modi and Shobhit K Patel (2015) in their research indicate that what kind of the evolution will the 5G bring, which inspires me that the same thing – 5G, is totally different in people eyes; For the normal citizens 5G is only new network, a faster net speed or a quicker connection. However, as the new communication technology, governments have already seen the importance of the 5G, in the research, Asvin Gohil et al professors basically introduce the structure of the 5G, work principle of 5G and the advantages/disadvantages. In 2013, Snowden disclosed the PRISM monitor program from the U.S government, through the project, the US government collects information directly from these nine corporate servers including Microsoft, Google, Yahoo, Facebook, PalTalk, AOL, Skype, YouTube and

Apple. Snowden also disclosed the details of the US larger-scale surveillance program named "Xkeyscore" on July 31, 2013. It can cover almost all online information and can collect Internet data to the fullest extent, including email, website information, search and chat records, etc. The "Xkeyscore" program has helped US intelligence agencies arrest hundreds of terrorist suspects, but the outside world is still very worried about such a large-scale monitoring plan. The world started to realize the importance of the security of information. Thing will be same in the 5G era, to own a leading position in 5G means to own a control in the world, especially for the large countries like China and the U.S.

All the pervious literatures above provided me plenty of information about the trade conflicts between China and the U.S. They also innovate me about how to establish the specific model and to analysis scientifically.

To make a more scientific research, it is important to find some indices to represent the technology indices. From Tim Plaehn's (2019) article, he pointed out that NASDAQ index is based on the weighting system, larger technology company will have a larger influence on the index. Thus, in this research, I will primarily compare three main indices, DJIA, S&P 500 and NASDAQ, to get a basic conclusion and analyze the specific company to draw a further conclusion.

Methodology

Research Design

After reviewing the research results of foreign and domestic scholars, I find that due to the different methods and data selection, the conclusions obtained are not completely consistent. My research ideas of this paper mainly refer to the advantages and disadvantages of the existing literature. And then through the correction of its defects and innovation of its advantages, researches are combined with the actual situation to describe the relationship between the real data and prediction of the economic development in both the U.S and China.

This paper attempts to collect main data in typical technology companies in China and the U.S, which is more likely to represent the changes in the whole technology field of both countries in the trade conflicts between the U.S and China. Based on this, I will analyze the influence on technology in the trade conflicts between both countries. Compared index of the selected specific companies' stock price with the whole market or other economic index, I can roughly establish the relationship between technology and economic in the whole trade conflicts in this time periods. In short, this article will select the data after the specific time period to construct a comprehensive index representing the relationship between technology and economic to prove whether technology is battleground of the trade conflicts.

Data Selection

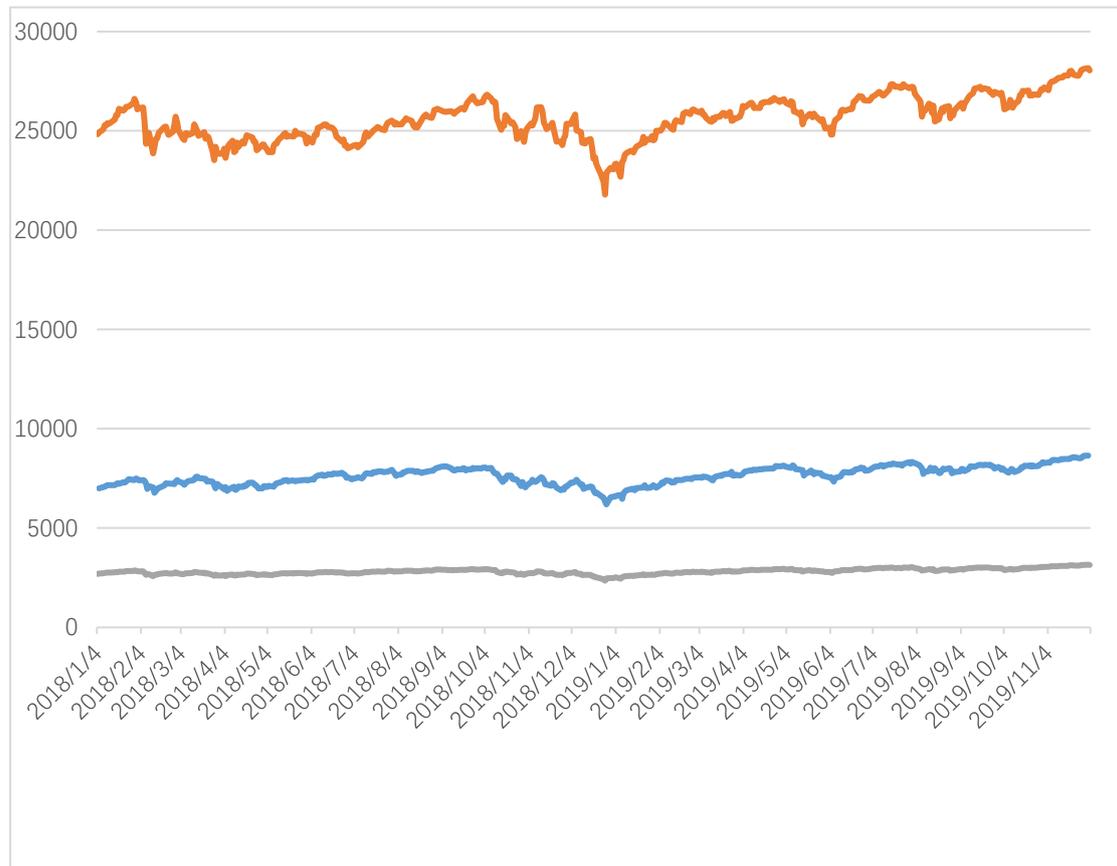
At first, I will select several representative companies in both countries. We decided to use the data from HUAWEI and Dà-Jiāng Innovations. The former one is the leader in 5G, and the latter one is one of the leaders in Unmanned Aerial Vehicle. These two companies represent the highest technologies in the market. However, these two companies did not list. As for the U.S, this research will choose Apple, Intel, Google etc. I used to select Qualcomm, which is the supply chain of HUAWEI and Apple, also a very important ingredient in 5G technology, but due to the pressure from competitors, Qualcomm's situation main not suit in this paper. Besides, Intel and Google, the best CPU producer and the leader in computer science, can also represent the U.S top technology in the market. In order to make the research more scientific, more companies will be selected refer to the Forbes and Brand Finance. What's more, S&P 500 and Dow Jones index will also be analyzed to indicate how the technology perform in the whole market.

Data Analysis

After I get the data described above, I will use mainly use graph and statistics to analysis data. Because this research is going to find the relationship between market and technology index to prove the topic. By collecting and analyzing the candlestick charts, first, I will compare the whole market data in both China and the U.S. with the selected technology companies index to figure out how the technology changes when facing the recession. Then, illustrating the data with the whole market during the trade conflicts. There might be a primary conclusion about the performance about the technology index in the whole market. Combined the primary conclusion with the specific policies, I can simply define the relationship between the technology and impact of the policies, which

can be used to prove the topic.

Result



Firstly, I collected the data of three main index in the U.S. market, the orange line represents the DJIA index in the past 2 years, the gray represents the SPY index and the blue line represents the NASDAQ index. Because the time line is started from the beginning of 2018, the change in these three indices may not so obvious, but it is still easily to find that there is huge decrease during the October of 2018 to January of 2019. In order to make an accurate answer, I narrow the timeline and calculate the changes in the indices and find a basic result. I narrowed the time period into 5 months, from October 2018 to February 2019. Compared to the SPX Index and DJIA index, CCMP lost more, it lost

23.46% of its value as present in the following table.

	SPX Index	CCMP	DJIA
MAX	\$ 2,925.51	\$ 8,091.25	\$ 26,828.39
MIN	\$ 2,351.10	\$ 6,192.92	\$ 21,792.20
Percentage	-19.63%	-23.46%	-18.77%

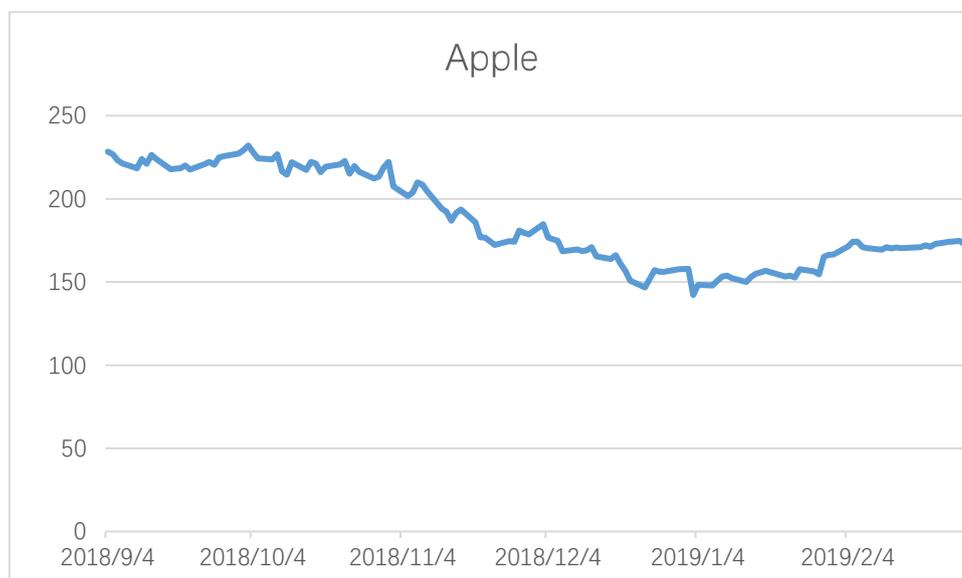
As the CCMP index is an average index of stock prices that reflects changes in the NASDAQ stock market. Nasdaq's listings cover all new technology sectors, including software and computing, telecommunications, biotechnology, retail and wholesale trade. It is mainly composed of hundreds of the fastest growing advanced technology, telecom and biological companies in the United States, including Microsoft, Intel and so on. This crash on CCMP index basically figures out that technology field is the hardest hit.

In order to find the reason of this decline, I reviewed the whole timeline of the trade conflicts and found that, in September 12th 2018, 69 days after the first conflicts, China and the U.S government reopen the negotiation. It should be the good news but unfortunately, the negotiation broke down. Only 2 days later, the U.S government imposed a 200 billion tariffs on the Chinese goods. This decision directly led a 1.4% decrease in CCMP index and marked the official start of trade conflicts.

Another policy is the raise of the interest rate in the U.S, which led a decrease in CCMP index, from 6332.2 to 6192.9, a 2.2% decline. For the U.S companies, higher funding costs have squeezed earnings, creating a vicious circle of further cuts in investment. How did the U.S. companies perform under the pressure from both the increasing rates and trade conflicts? Are the technology companies really suffer a significant declination that lead a huge impact on NASDAQ index?

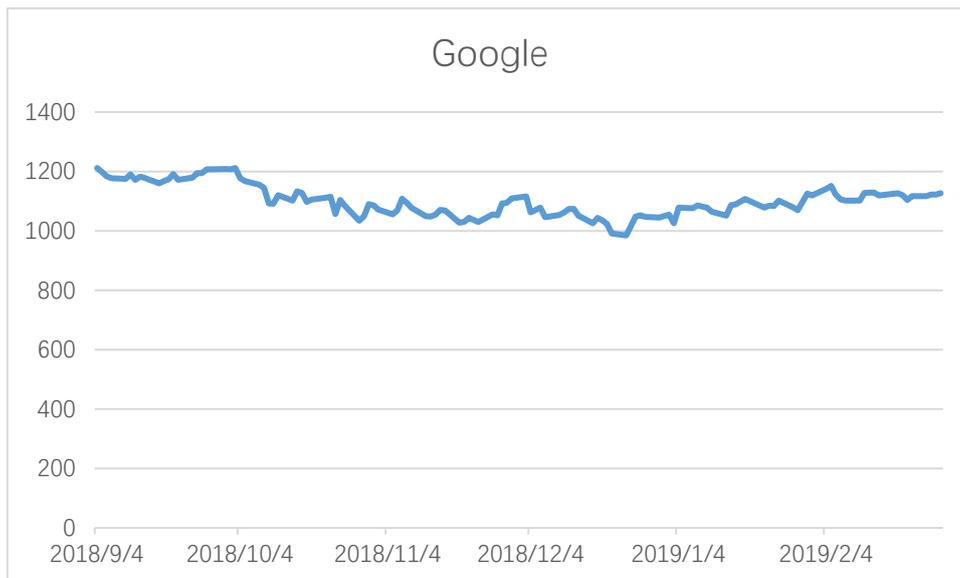
In order to have a more scientific results that it was the technology companies declined in the market, I selected several representative companies in NASDAQ with the same timeline as larger companies weighted more in the NASDAQ composite index.

First is Apple, one of largest company in the world, as present in the table below, Apple also suffer a recession in this time period, the highest value was 232.07 and meanwhile the lowest value is 142.19. Even Apple provided the world with its highest technology product, the recession due to the whole market did not stop.



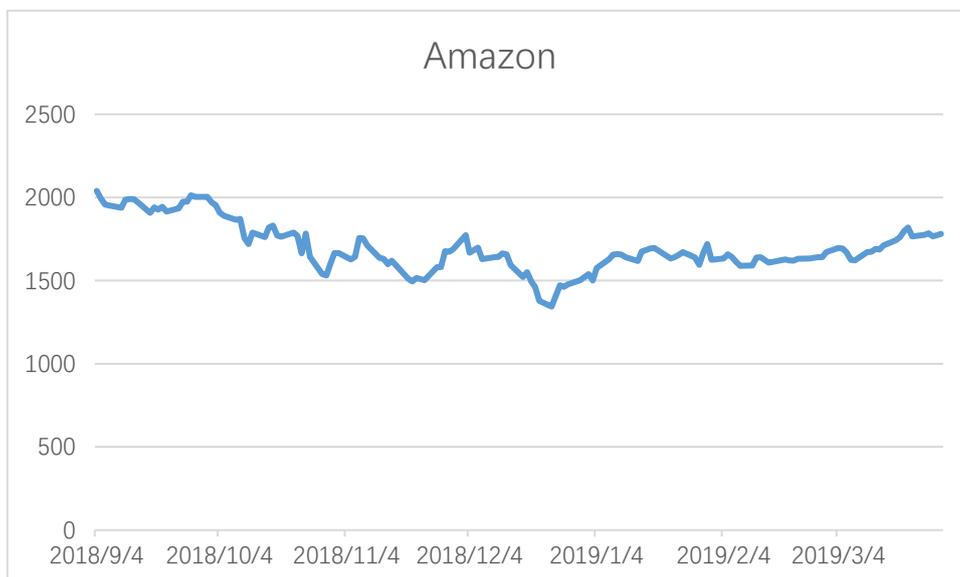
Another example is Google, I collected stock price over past 2 years of Google and use the same time period to draw a graph, the highest value of google in this time period was 1211.53 while lowest was 984.57. A maximum 18%

decrease in the stock price. Also, in September 12th the stock price of Google



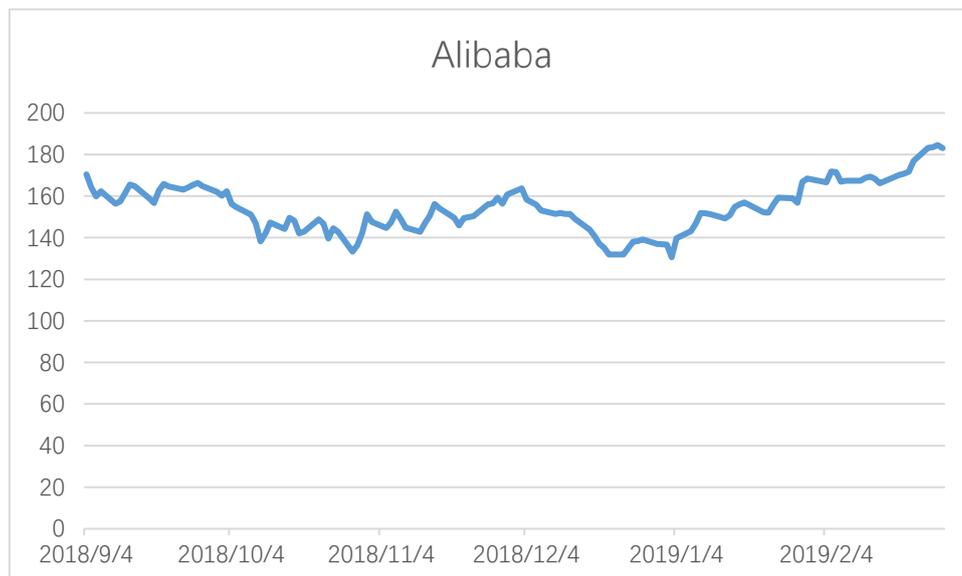
declined 18.39 \$, -1.54% responded to the policy.

Then I selected Amazon, which once had the largest market value, as the chart shows below, Amazon also suffered significant decline responded to the policy.



Amazon is a little different from Apple and Google because Amazon has a large share of online shopping, Not only the policies in the trade conflicts but also the domestic policies will effect the stock price. In the chart, two conspicuous

slash occurred in the middle of September and the beginning of the December, which accords with my thinking. Under both pressures, Amazon's stock price changes more significantly than Apple and Google. Trying to eliminate the influence of the shopping willingness, I searched data from Alibaba, China's largest online shopping company published in NASDAQ. The stock price of Alibaba did not sensitive when facing the trade conflicts. Except the conflict in the September 12th and the policy in the middle of December, the price Compared with three companies above, Alibaba's was more stable in the intermediate time while three compaines were keeping decreasing. As the



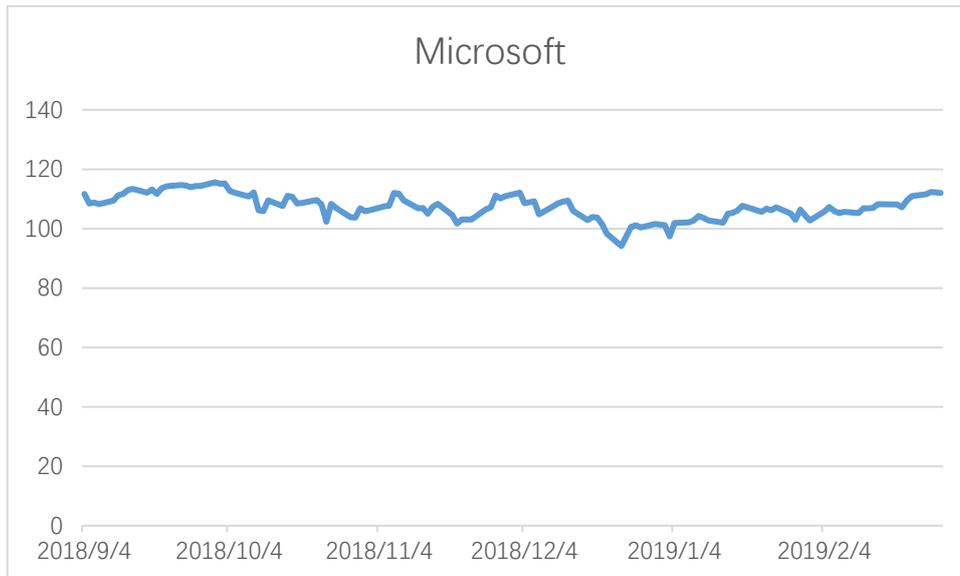
Alibaba did not own technology on 5G nor AI and maintlt focused on online shopping, it was reasonable influcened by the confilicts but as less as three companies above suffered.

Facebook, known as the social media in the U.S, also published in NASDAQ, even didn't suffer too much loss in the conflicts. As the traffi imposed on September 12th , the stock price of Facebook decreased only 0.64\$, 0.39%. Although the stock price is keeping decreasing in the following two months, it was usually stable when facing the trade conflicts as Facebook neither have large business on online shopping nor owns any important technologies like 5G and AI.



Last company that I chose is Microsoft, the largest computer system owner. Previous believing, Microsoft would also suffer a lot due to the conflicts, however, data shows that Microsoft didn't. Because the main business of Microsoft is selling computers, systems, and software. Nowadays, no alternative can be used so that microsoft still in monopoly. But the main reason why stock price of Microsoft didn't decrease even increase when facing the

trade conflicts was Microsoft did not have ant business in 5G and AI.



In conclusion, the whole market inevitably suffer a decrease when the trade conflicts officially began. However, NASDAQ reacted more sensitive than DJIA index and SPX index as NASDAQ has more technology companies. After selected some of significant technology companies in the NASDAQ, I drew a basic conclusion that the if the company are developing the 5G tech and AI, it suffer much while others not. With this preliminary result, the trade conflicts are probably mainly focused on the 5G and AI technology. Hence, technology, especially 5G and AI technology, is the main battleground of the Sino-U.S trade conficlits.

Limitations and contributions

Although in this research, I am trying my best to figure out whether the technology is the battleground of trade conflicts. As the impact of policies cannot be quantified, the relationship between policies and the stock price cannot be written into any functions. Moreover, stock price also can be influenced by many other factors such as the internal management problems.

Second, it is not objective to value the technology level only through the stock price of related companies. Specially China, a socialism country, its government owns many of core technology in significant areas like High-Speed Trains, Spaceships. The influences of stock prices may not directly reflect the influences, moreover, the data of those top technologies are hard to find. With the support of the government, the influences suffered on those technologies may not be easy to notice though they definitely exist.

Third, in this research, NASDAQ index will be used to represent the technology companies stock price index, although NASDAQ has most of technology companies, it still has many companies in different fields, thus, specific companies will be analyzed individually.

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