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The analysis of balance of payment and twin surplus in China

In Partial Fulfillment of the Requirements

for the Bachelor of Science in Finance

by

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Abstract

This thesis would discuss the balance of payment (BOP) in China and other relevant economic factors, including exchange rate, trade friction and roots of twin surplus. It would introduce the definition and background of BOP and focus on a special situation in China, twin surplus. After summarizing a number of existing literatures, the thesis proposed two hypotheses about the relationship between the total of current account and financial account and exchange rate; and twin surplus and trade friction. Using the big data from WTO and World Bank with regression model, these hypotheses had been proved in this thesis. In additional, the thesis also explained some descriptive questions, for example, the effects of twin surplus for Chinese market structure.

Key Words: Balance of Payment, Twin Surplus, Exchange Rate, Trade Friction

1 Introduction

The balance of payments (BOP) is the measurement of all international economic transactions between the residents of a country and foreign residents in a particular period. In detail, the international economic transactions consist of current account transactions, including the export and import of real merchandise such as automobiles and machine, and financial account transactions, which contain stocks, treasury bills and other financial goods. According to the category of international economic transactions, the BOP is composed of two major sub-account, the current account (CA) and financial account (FA).

With the development of international trades, the BOP plays a significant role in evaluating the competitiveness and sustainability of a nation's economic situation, and giving suggestions to government policymakers and multinational enterprises. The importance of the BOP shows in that the BOP is an indicator of a nation's foreign exchange rate, a forecast of market potential and an orientation of economic policies. Therefore, keeping a rational BOP is beneficial to a country in order to control the appreciation or depreciation of currency and maintain the competitiveness of market. Unfortunately, as the biggest economy entity in developing country, China has an unusual BOP in a long time.

As a general rule, the BOP should be balance that means the sum of the current account and financial account is almost zero. However, China experienced a series of

twin surplus from 2000 to 2013. The twin surplus shows both of the current account and financial account are positive. China's special BOP caused great influence in economic field, for examples, GDP, exchange rate, interest rate, inflation rate and etc. Thus, it is urgent to understand what is the situation of China's BOP, why China's BOP is unusual and how to improve China's BOP. Because China's BOP will involve a number of fields and some parts is general, this research thesis will select some important factors and hot issues to analyze China's BOP.

In this thesis, I will collect historical data of BOP in order to present the tendency of BOP in China from 1982. The structure of BOP in China will be analyzed by contrasting the percentage of the current account, including goods trade and services trade, and financial account, including direct investment and portfolio investment. After using tables and graphs to directly introduces the background of BOP, the appreciation and depreciation of RMB in the same period will be showed so as to research the impact of BOP in value change of RMB. It is worthy to explore the truth because the value of RMB determines the benefits of 1.5 billion people even more. The relationship between BOP in China and RMB can stimulate the enacting of relative policies which aid to improve the development prospect of economy in China.

For the next part, I will try to examine the question about the roots of the unusual twin surplus in China from several perspectives, such as the unsuitable

industries distribution, unbalance income distribution and high financial reserve. Without understanding of roots, the abnormal BOP in China cannot be guided into a proper development way. What's more, identifying the effects of twin surplus is also a significant link, but the research will focus on the foreign exchange market in short-run. The advantages and disadvantages of twin surplus will be defined, and some suggestions will be provided in this part.

Affected by twin surplus in China, the international friction between China and US is a hot issue in recent years. This thesis will use regression model to find the relationship between friction and BOP in China. As a powerful country, the export and import influence the international trades, and the inflow and outflow of capital and investment can make the foreign exchange market shock. Additional, the effects of US are definitely larger than those of China, thus the frictions of these two counties determines the structure of international trade and deep impacts the international economy.

The rest parts of this thesis are organized as follows: section 2 reviews some existing literatures about those fields that have mentioned above. Section 3 defines some variables and presents the methodology to answer the research questions. Section 4 shows the main findings of the analysis. Finally, section 5 concludes.

2 Literature Review

Chinese BOP is a general and crucial topic in economy development, thus those existing literature provide a large quantity of hypotheses and conclusions. In the literature review, I will present some previous ideas about the background, the roots and effects of twin surplus and international frictions.

2.1 The Tendency of BOP in China and the Value Change of RMB

2.1.1 The Tendency of BOP

The historical data of Chinese BOP started to record from 1982, and some researchers separated the process into four stages. Kang brothers (2017) concluded that Chinese BOP was "young and growing debtor" from 1982 to 1989; the second stage was that Chinese BOP became mature in a short-term from 1990-1993; the next phase, which was worthy to pay attention, "twin surplus" appeared from 1994 to 2012, except 1998; and since 2012 to now, "Chinese BOP has stepped out of the 'twin surplus' condition but still at the new creditor nation stage, and Chinese BOP is still seriously imbalanced with huge deficit".

Chinese BOP kept the disequilibrium in a long time, especially the current account. Herr (2009) said "From the beginning of the reforms until the mid 1990s the Chinese current account was balanced. After the mid 1990s current account surpluses increased and became permanent". The key point is "permanent" that meant China did not issue the functional policies or measures. Another explanation

is The People's Bank of China (PBoC) intervened current account surpluses by both financing and compensating net capital inflows. However, the extreme intervention made the problem worse. Despite the real appreciation of RMB after 2005, Chinese current account surpluses did not decrease, a situation could be considered as a conundrum. Additionally, Chinese current account surplus rise continually and become the biggest in the world.

2.1.2 The Value Change of RMB

The major effect of Chinese BOP change is the value change of RMB, or exchange rate, which means the value of one currency for the purpose of conversion to another. Thus, it is important to analyze the fluctuation of exchange rate of Yuan/Dollar and to re-evaluate the real value of RMB. Nazeer and Shaf (2015) mentioned that exchange rate was a determinant in affecting international trades and every economy. The fluctuation of exchange rate is the result of supply and demand, and they found that there is unilateral effect or bilateral relationship between BOP and exchange rate.

On the one hand, Nishi Malhotra and Priya Malhotra (2015) introduced the huge impact of devaluation of Yuan and cheaper exports in US economy. Chinese currency was closely pegged to the US currency. Therefore, the Exchange Trade Funds (ETFs) in Yuan in the US market is a negative condition under the situation of devaluation of Yuan. As a result, "the investors had overweight the Chinese Currency and

underweighted the US Dollar".

On the other hand, Ye and Chen (2012) presented the implication of RMB appreciation. Potential economic value may suffer great losses and other negative impacts due to the RMB appreciation, and "transmit through credit channel and contingent liability channel". Those phenomena would happen because of the currency mismatch of four major economic sectors, including the public sector, financial sector, corporate sector and household sector, in China. Then, compared with steady-speed appreciation that can lead macro-financial stability, "the accelerated appreciation may cause rapid inflow of foreign capital which increase asset price volatility and the size of foreign debt, and increase the financial sector and corporate sector operating pressure".

2.2 The Roots of Twin Surplus

In the external roots of twin surplus, Jia (2012) provided a clear idea that the direct reason of formation of twin surplus is keeping Foreign Exchange Reserves (FER). Because of the development of international trade and increased inflows of foreign investment, FER increased rapidly in the 1990s, and "the average annual growth rate during 1991-1996 was more than 60%". Rui (2000) mentioned a similar reason, the large inflow of foreign direct investment, which caused the capital inflows are higher than capital outflows and finally leaded the accumulate of FER.

From Zhang (2015)'s research, the main idea the paper presented is that internal demand is weak and rate of saving is high. To compensate the domestic demand, Chinese government published a series of export policies, which stimulated and expanded external demand and the foreign investment inflows, eventually forming twin surplus. There were four factors of internal imbalance, including imbalances of industries structure, income structure, financial structure and population structure, causing low demand and high saving.

Imbalance of industries structure mainly presents that the secondary industry, such as trade department, makes up too high percentage of GDP, especially deeply higher than developed countries. Imbalance of income structure's origins are government policies about lowest wage, interest rates and real estate. Those policies make the income distribution prefer to capital, showing the rate of resident's disposable income to GNP become lower while that of government's disposable income and saving to GNP become higher. Imbalance of financial structure is caused by mismatch between of banking system and economy development. What's more, Zhang mentioned an index about gender to explain the reason of imbalance of population structure.

2.3 The Effects of Twin Surplus in Foreign Exchange Market

Chinese twin surplus existed from 1998 to 2012, and the degree has deepened year by year. From the previous part about the roots of twin surplus, mostly

literature mentioned the important impacts of FER to twin surplus. Thus, long term surpluses in current account and capital account inevitably influence the development of foreign exchange market. According to Rui (2000) said, twin surplus in a particular nation will bring not only positive effects, also negative effects.

2.3.1 The Positive Effects

Chinese twin surplus affected financial market and international trade for a long time. Rui (2000) said, for a developing country growing its economy, surpluses mean the increase of nation's international competitiveness in economic field, the expansion of economic relation with other countries, and the advance of international status. More and more multinationals come to the PRC because of its market prospects, labor quality, and preferential policies. According to Li (2013)'s theory, during the openness of China, the benefits from twin surplus is bilateral, both for China and investor. The investor can acquire the labor, resource and preferential policies, while China get "technology spillover, capital inflow, and economic growth, among others" from foreign-invested enterprises.

2.3.2 The Negative Effects

For the negative effects, many existing literatures presented a comprehensive understanding. The research of Siebert (2007) showed even though China did not experience the J-style transformation curve because of Deng Xiaoping's reform, "China exhibits stark distortions" under the macroeconomic condition. Ming (2012)

also thought there are huge distorted resource allocation, such as the accumulation of over 3 trillion FER. The value of foreign reserves in China would sharply collapse if the USD depreciates or global inflation goes up in the future.

Additionally, Dennis (2012) mentioned that “large and sustained external imbalances can also be a prelude to economic adjustments that may be wrenching”. It seems that high surplus can develop economy in an unprecedented speed, but this strategy may loss potential in long-term. Chen (2013) presented that unreasonable net foreign currency assets in China had two negative impacts, including the high cost of ownership and the central bank’s monetary policy and exchange rate policy. Every year China would suffer a loss of interest from US Treasury and agency debt because China’s interest rate is higher than US’s national debt interest rate.

2.4 International Trade Friction

2.4.1 Background and Tendency of Trade Friction

Besides the above effects, twin surplus also influences the trade frictions enormous exports with other countries, especially US, according to Kang brothers (2017). Because of relatively lower producing cost and trading prices, Chinese manufacture market developed into international market and possessed large market share. This condition impacted other countries’ export and Chinese imports from those countries decrease. As a result, even though China has been the member of WTO, “China frequently encounters anti-dumping investigations from US-led WTO

members” and additional barriers for foreign trade. From Ma and Dou (2009), the trade relationship between US and China not only develop these two countries’ economic, but also promote world’s trade and bring benefits to all people.

Some scholars considered that weather the trade between US and China is imbalance or not. Hu and Yang (2019) concluded that the trade is balance by analyzing all components of US-China trade, including good and service trade, FDI, debt securities and non-monetary capital. In more detail, Zhou (2017) presented four main characters of US-China trade frictions. The first character is the range of products involved trade frictions has expanded from textile and light industry to service trade and technology standards. The second one is the form of trade frictions has become various. Next, the trade friction has tended to relative financial industry. The last character is the trade friction was related to other fields of international relation.

2.4.2 The Original Causes of US-China Trade Friction

Wu (2009) gave clear causes of US-China trade friction in external background and internal root causes. For external background, he said “Economic globalization is an irreversible trend in the development of modern economic. Under the impetus of globalization, it deeps the economic links between countries and strengthen the interdependence”. Under this circumstance, the possibility of trade friction will increase because of the differences among countries, which contain customer’s

preferences, social system and history. However, those differences could not be eliminated in a short term. Thus, the trade friction has been generated in acceleration.

For the internal causes, there were four reasons from China, including the increase of China's economic, deep dependence of trade with US, lower structure of export and the lack of self-discipline and export disordered in enterprises. From the view of US, the significant reasons are "US adopt the policy of restrict export" and conflicts between US foreign trade policy, liberalization and protectionism. However, Kim and Martin (2014) presented the different causes of trade friction. In their research, US plays a relative leader in this relationship and its major concerns contain China's currency policies, Intellectual Property Rights (IPR), China's obligation in WTO and China's industries policies. Therefore, the US-China trade friction was affected and triggered by different fields factors, including economic, politics, etc.

After summarizing the literature, the data and methodology will be introduced in next section. I will use the similar models, which have been created by above authors and involved in existing literature, to examine my two hypotheses.

3 Methodology & Date

In data and methodology section, I will introduce the data that I have collected, discuss the reasons that I choose the particular sample, explain how the model was created and how to analyze the data to answer my research questions.

I will propose two null hypotheses:

1) H_0: The total of current account (CA) and financial account (FA) in China did not have any significant impact on exchange rate of Yuan/ Dollar.
2) H_0: The twin surplus in China from 2000 to 2013 did not have any significant impact on trade friction between US and China.

3.1 Discussion of Data and Sample

In this part, I will show some significant data about balance of payment and some factors. Those data come from World Trade Organization (WTO), World Bank and Chinese official website, State Administration of Foreign Exchange (SAFE), which focused on collecting data about international trade. The dataset contains three items, including BOP, the exchange rate of Yuan/ Dollar, and trade friction index between US and China.

The first part of dataset is balance of payment, which contains current account, financial and capital account, good account and service account, in China from 1982 to 2018 from SAFE. The data of BOP in China will be applied to both two hypotheses

according to different period sample. On the one hand, for first H_0, I will use the whole period data of annual current account and financial account from 1982 to 2018 to study the relation with exchange rate. On the other hand, the quarter BOP from 2001 to 2013 (except 2012) should be involved in the second hypothesize, due to the period of twin surplus from 2001 to 2013 (except 2012) in China is most typical and special in China's development. It is hard to find another consecutive 10 years twin surplus period from historical data. However, I will delete some samples in a special situation, BOPs exist twin surplus annually but exist deficit quarterly, to confirm the accuracy of research.

The second is historical data about exchange rate of Yuan/ Dollar from 1982 to 2018. The data contains annual average closing price, year open and year close, year high and low, and annual change. The annual average closing price will be utilized to examine the tendency of exchange rate. Those data of exchange rate and the total of CA and FA can provide answer of the first hypothesis.

The last part is about international trade friction between US and China. The historical rate of anti-dumping and countervailing, which are two main approaches of trade friction between US and China, of China by US to those of China by the world from 2001 to 2013 quarterly will be used in evaluating the trade friction. In addition, the times of anti-dumping and countervailing in every quarter between 2001 and 2013 have been collected to calculate the weight average of anti-dumping and

countervailing rate between China and US. Finally, the percentage of imports in US from China in the same periods also was used in regression model of second hypothesis with twin surplus data.

3.2 Discussion of Model and Methodology

In this subsection, the thesis will discuss the detail of model, which one methodology will be chosen to test the null hypotheses, and how complex data connect with each other.

$$Exchange\ Rate = \alpha + \beta * (Current\ Account + Financial\ Account)$$

I will use the simple regression in first H_0: The total of current account and financial account in China did not have any significant impact on exchange rate of Yuan/ Dollar. The independent variable is the total of current account and financial account in China from 1982 to 2018, while the dependent variable is exchange rate of Yuan/ Dollar in the same period.

$$Trade\ Friction\ Index = \alpha + \beta * Twin\ Surplus$$

For the second null hypothesis, H_0: The twin surplus in China from 2000 to 2013 did not have any significant impact on trade friction between US and China, I also apply simple regression model to test the relation. The independent variable is the

figure of twin surplus from 2001 to 2013 in quarter, and the dependent variable is the trade friction index, which contains the anti-dumping rate, countervailing and imports in US from China. Then I will introduce trade friction index model in detail.

Trade Friction Index= $(AD*N_1+CV*N_2)/((N_1+N_2)*I)$

AD = Anti-dumping from US to impact China

CV = Countervailing from US to impact China

N_1 = The number of anti-dumping

N_2 = The number of countervailing

I = Ratio of imports in US from China to total imports in US

According to Kuang (2010), the trade friction index model can analysis the degree of trade friction between two countries by calculating the weight average of primary ways of international trade conflicts, such as anti-dumping, safeguard, countervailing and etc. Then the weight average should be divided by ratio of imports in US, showing the degree of US market share that Chinese exports accounted for. Using the trade friction index model can easily understand the exact number of trade friction between US and China instead of measuring trade conflict by descriptive method.

In the next part, the results of regression and findings will be presented to decide whether the null hypotheses should be reject or not. The differences and similarities between others' conclusions and mine will be discuss and analyzed.

4 Analysis & Findings

In the previous section, data and methodology, the data about BOP in China, exchange rate and trade friction has been showed and the sample form is the period. Following those data, the regression model and trade friction model were introduced to analyze the data. In this results section, I will discuss and present all findings from existing literatures and data analysis to answer the research questions.

4.1 The Tendency of BOP in China

For the first question about the tendency of BOP or the background, Kang brothers (2017) provided the brief but vivid conclusion. However, this thesis will use original line chart to indicate more details, and the data of BOP come from SAFE. From the Figure 1, starting at 5 billion dollars in 1982, BOP showed a gradual rise until 2000, when the number tended to increase sharply. After that, BOP reached the highest level in 2010, with 525 billion dollars. Then the year 2011 to 2013 witnessed a dramatic fluctuation, followed by a rapid downward trend after 2014. Interestingly, the current account and financial/capital account kept a similar pattern. However, several significant deficits occurred in financial/capital account in 2012 and 2015, the negative number is 32 and 91 billion dollars respectively.

As for good and service international trade, according to Figure 2, good trade in China remained surplus in almost period and the degree of surplus increased with the development of international trade. In addition, the figure hit the peak in 2015,

with 571 billion dollars. In contrast, the service stayed consistent deficits from 1990 and the trend has become more severe in recent years.

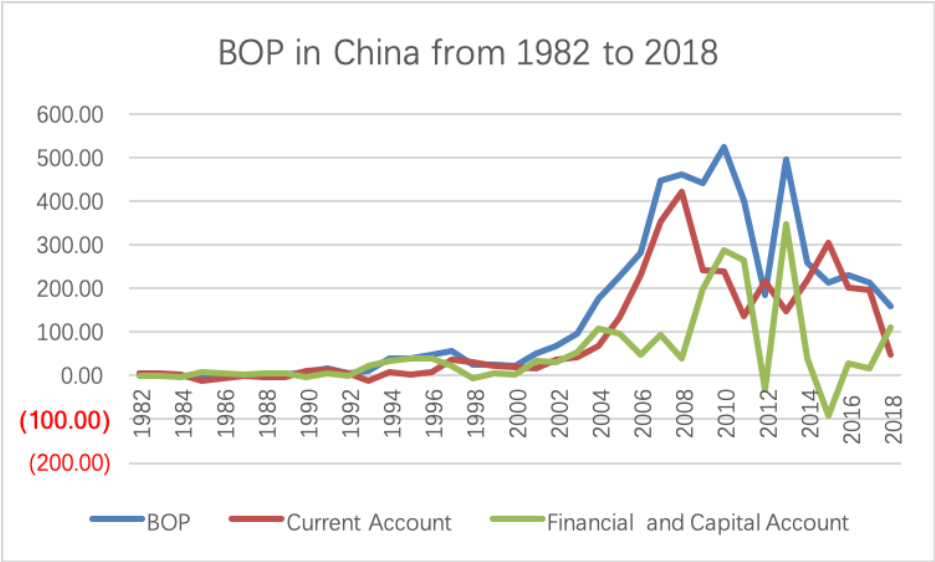

Figure 1, Balance of Payment, Current Account and Financial/Capital Account in China, 1982 to 2018

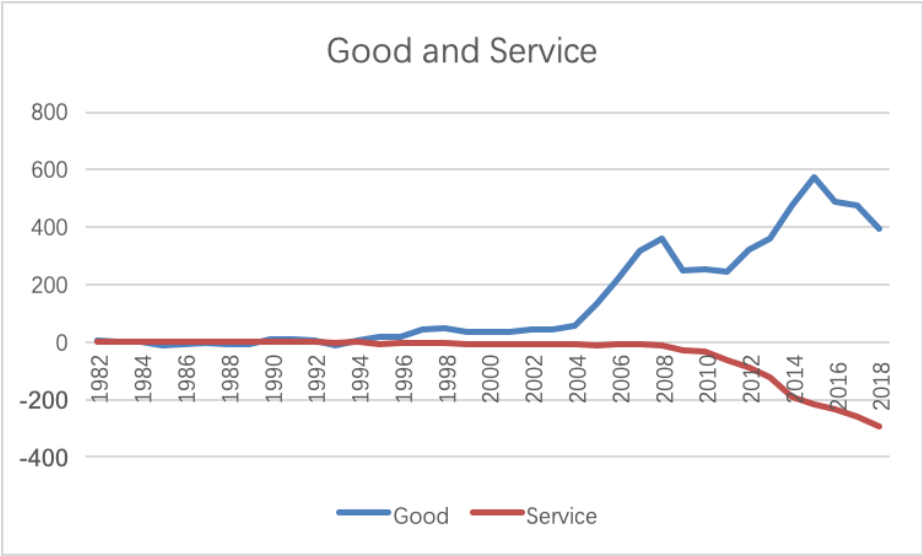

Figure 2, The Good and Service in Current Account, 1982 to 2018

4.2 The Roots of Twin Surplus

The reasons of appearance of twin surplus can be complex and controversial,

especially for China's continuous period from 2000 to 2013. The large inflow of foreign direct investment should be the main root of twin surplus, just as Rui and Jia mentioned in their articles. Additionally, the interior structure also existed some problems, which are potential roots of twin surplus, and those problems must be solved eagerly. Because China heavily focused on the speed of economic development instead of suitable structure, the further development will be limited and China will hard to keep a healthy economy unless overcome the problems of imbalance structure, including industries structure, income structure, financial structure and population structure.

4.3 The Effects of Twin Surplus

Some scholars said twin surplus left a deep and wide influence for China, and the negative side effects are larger than the positive. On the one hand, twin surplus presented the development of international trade at least, and more multinational enterprises, which can provide working opportunities for Chinese labor and make China more internationalism. On the other hand, twin surplus will impact the exchange rate policies in a negative direction, just as Chen said, and later I will show the relationship between BOP and exchange rate in detail. What's more, twin surplus can decrease the competitiveness and sustainability of China to battle with other countries in the future. The best way to treat the effects of twin surplus is to naturally accept those influence and thoroughly study twin surplus but solve this vast problem seriously.

4.4 Relationship between Total of CA and FA and Exchange Rate of Yuan/Dollar

In this parts, I have analyzed the relationship between the total of current account and financial account in China from 1982 to 2018 and the exchange rate of Yuan/Dollar by regression model, which was mentioned in methodology section. The output of regression was summarized in Table 1. The first null hypothesis is H_0: The total of CA and FA did not have any significant impact on exchange rate, and the confidence level is 90% for this regression process. From the table 1, P-value is approximate 0.0667 which is less than 0.1. Therefore, in this situation, the null hypothesis should be rejected, showing that the total of CA and FA in China had significant impact on exchange rate of Yuan/Dollar.

The result is similar to Nazeer and Shaf's finding, there is unilateral effect or bilateral relationship between the total of CA and FA and exchange rate. It is important to know the factors that can affect the exchange rage, due to exchange rate play a keys role in international trade and means the purchase power of particular currencies. Finally, the equation has been inserted the numbers into α and β:

Exchange Rate= 5.7573+ 0.00374(Current Account + Financial Account)*

	Coefficients	*t Stat*	*P-value*
Intercept	5.7573	13.3844	2.4958E-15
CA and FA	0.00374	1.8922	0.0668

Table 1, Regression Output between the total of CA and FA and Exchange Rate of Yuan/Dollar

4.5 Relationship between Twin Surplus and Trade Friction

Last but not least, the second null hypothesis, H_0: The twin surplus in China did not have any significant impact on trade friction between China and US. I also use the regression process and the trade friction index model, which can evaluate the trade friction in real number, to examine the relationship. In this case, the quarter data of twin surplus period have been analyzed from 2001 to 2013 (except 2012). In addition, the anti-dumping and countervailing, as main approaches of trade friction between US-China, are important data source in trade friction index model. The confidence level is also 90% and the observation is 41, which delete some irrelevant samples.

The regression summary is Table 2, from that I found the P-value is about 0.0523, the number is smaller than 0.1, so the null hypothesis should be rejected. Therefore, the finding is that twin surplus in China have significant impact on trade friction between China and US. Additional, the coefficients correlation is a negative number, which means the relationship between the twin surplus and trade friction should be negative. The higher twin surplus, the lower trade friction. However, the finding is opposite to Kuang's idea. The different samples usage, quarter and annual, could be the major reason to the reverse results. I also found there are the "truce periods" of trade friction in some quarters every year, whereas the "truce periods" effects would be slight in researches that study annual data. Finally, the α and β are replaced by real number:

*Trade Friction Index= 7.3296 – 0.03266*Twin Surplus*

	Coefficients	*t Stat*	*P-value*
Intercept	7.3296	4.6169	4.161E-05
Twin Surplus	-0.03266	-1.9994	0.0526

Table 2, Regression Output between Twin Surplus and Trade Friction Index

4.6 Limitations

In the last part of findings section, I will discuss some limitations about my research model and methods. The trade friction index model, which comes from Kuang's idea, originally was used in analyzing the annual data instead of quarter data, so my result about second hypothesis, examining the relationship between twin surplus in China and trade friction, is not highly convinced.

Regarding to the other approaches of trade conflicts between US and China, including tariffs, safeguard, quantitative restrictions, technical barriers to trade and tariff-rate quotas, this thesis abandon some conflicts which were not frequent between US and China, rather than select anti-dumping and countervailing to test the trade friction index. In this case, the figures of trade friction index may not exactly precise and will lead some slight and acceptable bias in results.

5 Conclusion

This thesis attempted to explore the balance of payment in China from 1982 to 2018 and other economic factors, such as exchange rate, economic structure, and trade friction. The main goal of thesis was providing answers of five research questions from existing literature and historical data, while the methodology was simple regression.

The first question, the tendency of BOP in China, has been discussed by original graphs, which depicted the relation of CA and FA, good and service, and the data came from State Administration of Foreign Exchange (SAFE). Then using some descriptive paragraph, the roots and the effects of twin surplus was explained from several aspects, including positive and negative, internal and external respectively. For those three research questions, a number of researchers had been studied them from a long period. Therefore, I could not contribute any new findings and I merely summarized the existing literature, which I agreed with.

Regarding to fourth research question, the thesis provided hypothesis to explore the relationship between the total of current account and financial account and exchange rate of Yuan/ Dollar. After getting result by regression, the finding was similar to existing wide idea that the sum of CA and FA has a positive relation with exchange rate for a particular country. Therefore, the appreciation and depreciation of currency would be influenced by balance of payment.

As for trade friction question, I imitated the equation model but used different period samples, which were more accurate and newer but also inevitably existed some limitations. My result was different from another researcher and I found there was a negative relationship between twin surplus in China and trade friction between US and China. The result was opposite to my original assumption and some possible reasons has been presented in last section.

With the development of international trade among almost countries, the BOP will play a significant indicator for every country that involve in exports and imports. The experts can predict lots of factors by analyzing the BOP such as exchange rate, economy structure, development prospect and etc. This thesis is a plain research but the further studies cannot stop because it is more hard for us to control the economy. The solutions of twin surplus and twin deficits should be provided, especially for those countries with abnormal balance of payment. The healthy BOP is the basement of economic development.

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7 Tables and Figures

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Twin Surplus	-0.03266	-1.9994	0.0526

Figure 1, Balance of Payment, Current Account and Financial/Capital Account in China, 1982 to 2018

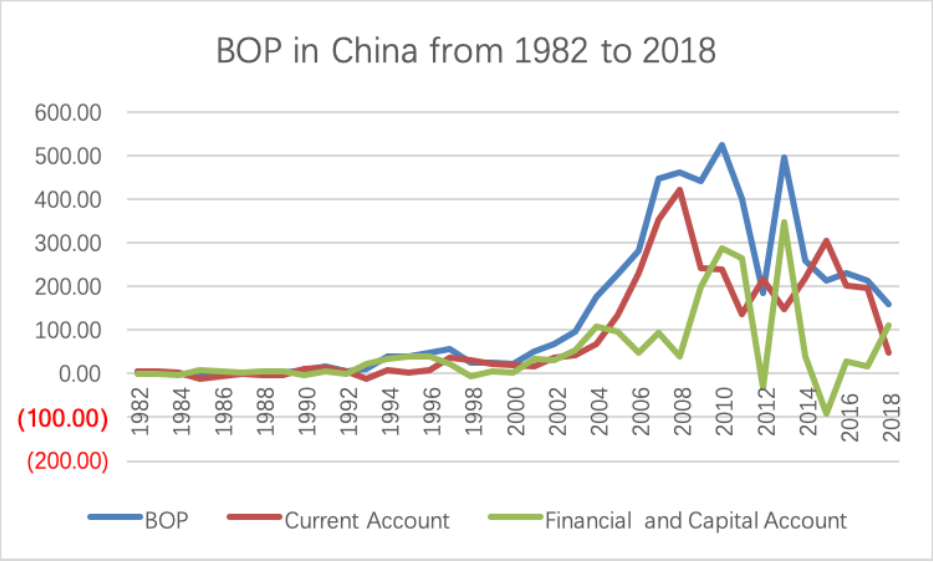
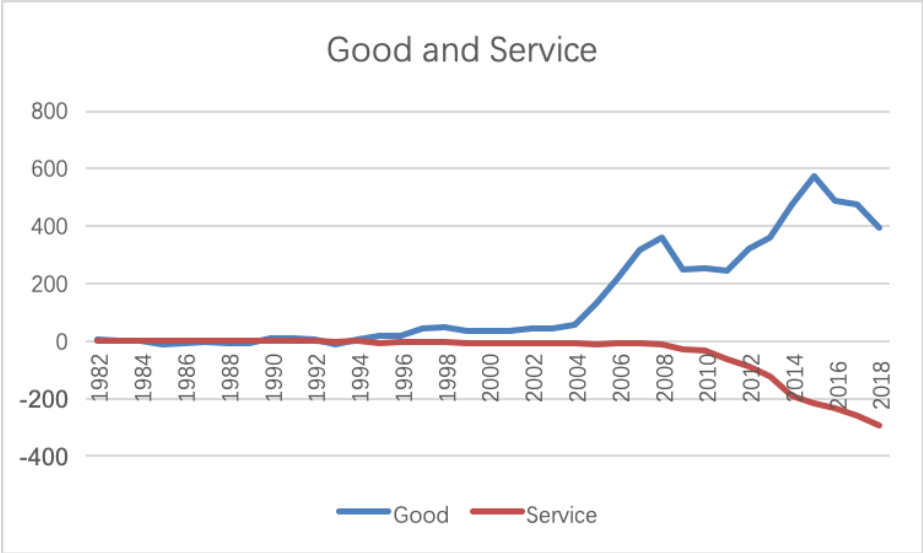


Figure 2, The Good and Service in Current Account, 1982 to 2018



8 Appendix

Appendix A, Detailed BOP in China, 1982 to 2018

YEAR	**BOP**	Current Account	Financial and Capital Account	Good	Service
2018	**160.20**	49.09	111.11	395.17	(292.25)
2017	**213.05**	195.12	17.93	475.94	(258.93)
2016	**229.45**	202.20	27.25	488.88	(233.15)
2015	**212.96**	304.16	(91.21)	576.19	(218.32)
2014	**257.92**	219.68	38.24	475.99	(191.97)
2013	**494.30**	148.20	346.10	359.89	(124.51)
2012	**183.63**	215.39	(31.77)	321.59	(89.75)
2011	**401.57**	136.10	265.47	243.55	(61.65)
2010	**524.68**	237.81	286.86	254.18	(31.16)
2009	**441.73**	243.26	198.47	249.51	(29.38)
2008	**460.69**	420.57	40.13	360.65	(11.81)
2007	**447.41**	353.18	94.23	315.95	(7.91)
2006	**281.15**	231.84	49.31	217.75	(8.83)
2005	**227.73**	132.38	95.35	134.19	(9.56)
2004	**177.09**	68.94	108.15	58.98	(7.81)
2003	**97.92**	43.05	54.87	44.37	(8.55)

2002	**67.71**	35.42	32.29	44.17	(6.78)
2001	**52.18**	17.41	34.78	34.02	(5.93)
2000	**22.44**	20.52	1.92	34.47	(5.60)
1999	**26.29**	21.11	5.18	35.98	(5.34)
1998	**25.15**	31.47	(6.32)	46.61	(2.78)
1997	**57.98**	36.96	21.02	46.22	(3.40)
1996	**47.21**	7.24	39.97	19.54	(1.99)
1995	**40.29**	1.62	38.68	18.05	(6.09)
1994	**40.30**	7.66	32.64	7.29	0.07
1993	**11.57**	(11.90)	23.47	(10.65)	(1.14)
1992	**6.15**	6.40	(0.25)	5.18	(0.19)
1991	**17.85**	13.27	4.58	8.74	2.86
1990	**9.22**	12.00	(2.77)	9.17	1.50
1989	**2.11**	(4.32)	6.43	(5.62)	0.69
1988	**1.47**	(3.80)	5.27	(5.32)	1.25
1987	**3.03**	0.30	2.73	(1.66)	1.95
1986	**(0.49)**	(7.04)	6.54	(9.14)	1.75
1985	**(2.93)**	(11.42)	8.49	(13.12)	0.62
1984	**(1.72)**	2.03	(3.75)	0.01	0.04
1983	**2.87**	4.24	(1.37)	1.99	0.58
1982	**3.94**	5.67	(1.74)	4.25	0.56

Appendix B, Regression Output 1

Regression Statistics	
Multiple R	0.3046
R Square	0.0928
Adjusted R Square	0.0669
Standard Error	1.9838
Observations	37

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 90.0%*	*Upper 90.0%*
Intercept	5.7573	0.4301	13.3844	2.4958E-15	5.0306	6.4841
X Variable 1	0.00374	0.00197	1.8922	0.0668	0.0004	0.0071

Chart 3, Regression Output 2

Regression Statistics	
Multiple R	0.3049
R Square	0.0929
Adjusted R Square	0.0697
Standard Error	5.2929
Observations	41

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 90.0%*	*Upper 90.0%*
Intercept	7.3296	1.5876	4.6169	4.1608E-05	4.6548	10.0044
X Variable 1	-0.03266	0.01633	-1.9994	0.0526	-0.0602	-0.0051