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**The role of foreign exchange in Sino-US trade frictions**

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for the Bachelor of Science in Finance

By

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## **ABSTRACT**

The goal of this thesis is to find out what role foreign exchange plays in sino-US trade frictions and to put forward some measures to alleviate the risks caused by the exchange rate in trade friction. First, I explain why Sino-US trade frictions occur. In the next step, according to some relevant reports and theses, I find that foreign exchange rate influences Sino-US international trade. Then, I build a linear regression model and conduct two data analyses to study the impact of foreign exchange rate on Sino-US trade friction. At the end of this thesis, I also write some limitations and contributions of my research and make some suggestions to export companies on how to maintain export in the trade friction.

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## **Introduction**

Recently, Sino-US trade friction has become a hot topic. In this years, trade frictions between China and American are escalating. The series of problems led to the present situation – Sino-US trade war. As the world's two major economies, the problems caused by trade friction between China and US, will greatly affect the economic and trade relations between the two countries. China's exports to the United States have soared in recent years, but imports from the United States have been limited by Chinese state policy. To counter this, the United States has imposed a series of tariffs to restrict Chinese exports to the United States and China subsequently imposed some tariffs on the United States.

Foreign exchange plays an important role in Sino-US trade friction. Both sides want to win the victory in this matchup through foreign exchange. Foreign exchange is the trading of different national currencies or units of account. It is important because the exchange rate, the price of one currency in terms of another, helps to determine a nation's economic health and hence the well-being of all the people residing in it.

There is a saying that the United States achieved victory in the US-Japan trade war in the 1990s by controlling foreign exchange rates. Now it wants to do the same to limit China's economy. Neither China nor the United States has taken responsibility for the change of exchange rate. But on August 5, 2019, the yuan did depreciate. The yuan weakened beyond 7 per US dollar for first time since 2008 driven by market forces and escalating Sino-US trade conflicts. I don't think this devaluation happened by accident. That must mean someone is trying to influence sino-us trade friction by adjusting the exchange rate.

Charts: Historical Rates for Conversion of USD to CNY: Last 6 months



I want to use this research to find out what role foreign exchange plays in sino-US trade frictions. First, I found some information about the previous US-Japan trade war. Then I compared the situation at the time with the current Sino-US trade frictions. Thirdly, I found out the information about foreign exchange in the current Sino-US trade war. In order to figure out the impact of RMB exchange rate on sino-us trade, taking RMB exchange rate as an independent variable, I constructed two regression models for import and export respectively and to ensure the completeness, I chose the GDP of China and the United States as the control variable. Finally, I will use some data for verification and analysis and put forward some opinions on dealing with foreign exchange risks in the trade war.

## Literature Review

With the increase in global international trade, currency circulation between countries has intensified, and foreign exchange has become more important. This literature seeks to understand what important role the foreign exchange play in Sino-US trade frictions. Grover (2019) though that it is the main reason of the importance of foreign exchange to determine the value of foreign investment. Due to this characteristic of foreign exchange, a low and stable exchange rate can attract more foreign investors because it is profitable for foreign investors. A high and unstable exchange rate means huge risks for foreign investors. Therefore, the foreign exchange plays a huge role in attracting foreign funds.

The papers that investigate exchange rate find that exports of industries with less tangible capital or more heavily dependent on external financing have fallen more during periods of high uncertainty. Brabant (2019) though the marginal effect of fiscal restrictions is determined by the relative size of the exporters within the sector. Through the heterogeneous-firm model, he concludes that exchange rate uncertainty affects companies by increasing the interest rates that companies need to pay. The lender is concerned about the exchange rate because it affects the income of the exporting enterprise and the ability to repay the loan. Exchange rate uncertainty will increase the risk of international trade. Providing additional guarantees to financially constrained companies can reduce this risk.

An inspiration for my paper was O'Brien (2013). He said that foreign exchange refers to the movement of money between countries and the conversion of a country's currency into the currency of another country, in order to pay off a special business activity of international debt and debt relations. Foreign exchange is actually the debt that can be used in the balance of payments deficit held by the monetary administration. The foreign exchange rate affects the

ability to repay debt to a large extent. Therefore, in some special cases, the government can adjust its foreign exchange rate to increase its ability to repay debt or weaken the ability of other countries to repay debt.

As early as 1998, this risk was mentioned in a book on the Japanese foreign exchange market. Reszat (1998) mentioned that excessive foreign exchange reserves pose unnecessary risks while praising Japan's growing foreign exchange market. At that time, Japan held a large amount of US Treasury bonds and huge foreign exchange reserves. The Japanese government believes that it can get a lot of benefits from that. Reszat (1998) argues that such a rigorous foreign exchange transaction carries a huge risk. Once the United States lowers the US dollar exchange rate, the Japanese government will suffer heavy losses.

It turns out that Reszat made the right prediction. For US, it is the successful form of US-Japan frictions to reduce the US trade deficit with Japan. (Urata, 2019) The most important means is to adjust the foreign exchange rate. The United States has lowered the exchange rate of the US dollar. On the one hand, this operation has made the yen more purchasing power in the US market. On the other hand, it weakens Japan's ability to pay its debts. This has caused a huge blow to the Japanese economy. Foreign exchange played an important role in the US-Japan trade war.

Recently, Sino-US trade friction has gradually intensified. Foreign exchange is likely to become a weapon for China or the United States to retaliate against each other in this trade friction. The Wall Street Journal first raised this doubt at a press conference. Mr. Zhu Guangyao, vice minister of Finance, said 'China will remain a responsible long-term investor.' (SCIO, 2019). China will not operate foreign exchange at will. But Mr. Zhu Guangyao also said 'China never succumbs to any external pressure.' (SCIO, 2019). It means that China will not use the exchange rate

adjustment method to retaliate against the US in Sino-US trade friction, unless it is a last resort. It can be seen that foreign exchange is important in Sino-US trade friction. It is an important counter-measure in trade friction. The exchange rate of the Yuan against the US dollar has been maintained above seven for a long time. Yan (2019) said 'Besides, China does not have to worry about the yuan's exchange rate against the dollar too much because its exchange rate against a basket of currencies is stable.' But in stark contrast to China's reduced intervention in the foreign exchange market, the US government deliberately devalues the dollar, which is more like currency manipulation.

## Research Design

In this article, I use quantitative and empirical research with data. Then I use regression function to test the hypotheses and find the relationship between exchange rate and China-US trade. Trade friction is mainly manifested in international trade volume, that is, national import and export. Therefore, this article studies the impact of exchange rates on China-US trade friction by studying the impact of exchange rates on China's imports and exports. If the exchange rate affects imports and exports, it will also have an impact on Sino-US trade frictions.

This article mainly studies how the exchange rate affects China-US import and export trade by establishing a linear regression model. Linear regression is a linear approach to modeling the relationship between a scalar response and one or more explanatory variables (WIKI, 2019). Linear regression models can establish linear causality between variables for analysis.

In the regression model established in this article, three variables are mainly selected: exchange rate, import and export. Import and export are dependent variable and they represent China-us trade. The exchange rate is the independent variables. In general, the depreciation of local currency exchange rate, that is, the depreciation of foreign currency ratio, can promote export and restrain import. If the exchange rate of the local currency rises, that is, the ratio of the local currency to the outside world rises, which is conducive to imports but not conducive to exports.

Since GDP has a huge impact on trade, the GDP of China and the GDP of United States are also included as the control variable in the model constructed in this article. The purpose of this is to make the regression model established more practical and the research more effective in this article.

After established the variables, considering the net export model is a net difference. It can not fully depict the real reflection of China-US trade on the exchange rate. On the other hand, the mechanism of exchange rate of the influence of the import and export of deviation. Therefore, separate research is helpful to explore the exchange rate for the specific influence mechanism of balance of payments, then two regression models have been established, as shown below:

$$\ln IM = \alpha + \beta_1 \times e + \beta_2 \times \ln CHGDP + \beta_3 \times \ln USGDP \quad (1)$$

$$\ln EX = \gamma + \delta_1 \times e + \delta_2 \times \ln CHGDP + \delta_3 \times \ln USGDP \quad (2)$$

The model (1) is the regression model of import and exchange rate. The model (2) is the regression model of export and exchange rate. Considering the following factors, I designed these two models. First, in order to quantitatively describe international trade, this article must choose a value to represent Sino-US international trade. The volume of imports and exports is a good choice, it can reflect the status of trade very intuitively. Second, the reason I chose import and export rather than net exports as the dependent variable is that the net exports can net exports can reflect a country's economic growth but not its foreign trade situation. The subject of this article is the role of exchange rates in the China-US trade war. Therefore, the impact of exchange rates on China-US trade conditions must be affected, not on China's economic development. Finally, import and export must be studied separately. Because they are two different variable, the effects of independent variables on imports and exports are different. As mentioned in this article, the growth of the local currency exchange rate will promote exports and inhibit imports. In these two models, “e” is exchange rate; “lnIM” is the logarithmic growth rate of US imports from China; “lnEX” is the logarithmic growth rate of US exports to China. “lnCHGDP” is the logarithmic growth rate of the GDP of China. “lnUSGDP” is the logarithmic growth rate of the

GDP of US. To keep the units consistent, imports, exports and GDP are measured in these models with logarithmic growth rates. “ $\alpha$ ” and “ $\gamma$ ” are constants. “ $\beta_1, \beta_2, \beta_3, \delta_1, \delta_2$  and  $\delta_3$ ” are coefficients.

## Result

### Preliminary test

The original data used in the model established in this paper are value of U.S. trade in goods (export and import) with China, the value of Chinese GDP and US GDP, and the exchange rate of RMB. I found all these data on the Internet. The data time interval selected in this article is from 2008 to 2018, and all data are in years. In view of the inconsistent order of magnitude of the data obtained, I take the logarithmic growth rate of imports, exports and GDP to unify the order of magnitude. I sorted out the data and got the following table.

YEARS	lnIM	lnEX	e	lnCHGDP	lnUSGDP
2009	-0.02246	-0.00631	0.146335	0.012626	-0.00189
2010	0.036529	0.065508	0.146473	0.019819	0.003852
2011	0.01527	0.027148	0.151257	0.024693	0.003751
2012	0.010649	0.013458	0.15874	0.014617	0.004273
2013	0.005647	0.002673	0.160679	0.01293	0.003678
2014	0.009528	0.021571	0.165235	0.00973	0.004417
2015	0.005215	-0.01348	0.160937	0.006865	0.003995
2016	-0.00655	-0.00073	0.152453	-4.2E-05	0.002694
2017	0.014412	0.024989	0.144434	0.007744	0.004143
2018	0.010424	-0.01648	0.154018	0.010937	0.00511

Table1

After data processing, this article makes an empirical analysis of the two models established before.

## Model (1)

The model (1) is the regression model of import and exchange rate. The regression analysis of model (1) is shown in the table below.

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*Regression statistics (import)*

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Multiple R	0.912925
R Square	0.833431
Adjusted R Square	0.750147
Standard Error	0.00759
Sample size	10

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Table 2

According to table 2, R Square is very close to 1. This means that the fitting degree of the regression model is very high. The exchange rate and the GDP of the two countries are sufficient to explain the change in the value of imports. Multiple R is very close to 1 too, so this means that there is a strong positive correlation between the independent variables which are exchange rate and GDP and the value of imports.

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	<i>Standard</i>				<i>Upper</i>	
	<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>95%</i>
Intercept	0.081987272	0.060765712	1.349235766	0.225947821	0.066701069	0.230676
e	0.694156648	0.399099274	1.739308221	0.132637182	-1.67071739	0.282404
lnCHGDP	0.856108382	0.377587578	2.267310767	0.06390325	0.067815138	1.780032
lnUSGDP	6.627806798	1.431448653	4.630139394	0.003577175	3.125178125	10.13044

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Table 3

According to table 3, the P-values of  $e$  and  $\ln\text{CHGDP}$  are more than 0.05, but the P-value of  $\text{USGDP}$  is less than 0.05. It means that US GDP has a significant effect on US imports from China, but RMB exchange rate and Chinese GDP have no effect on US imports from China.

**Model (2)**

The model (2) is the regression model of export and exchange rate. The regression analysis of model (1) is shown in the table below.

<i>Regression statistics (export)</i>	
Multiple R	0.678063
R Square	0.459769
Adjusted R Square	0.189654
Standard Error	0.022049
Sample size	10

Table 4

According to table 3, the Multiple R and R Square are lower than the corresponding values in table 2. This means that the fitting degree of the regression model is low. The exchange rate and GDP are not sufficient to explain the change in the value of export. And there is a weak positive correlation between the independent variables and the value of export.

According preliminary test, I get the following result. About the imports, the exchange rate and the GDP are sufficient to explain the change in the value of imports. There is a strong positive correlation between the independent variables which are exchange rate and GDP and the value of imports. US GDP has a significant effect on US imports from China, but RMB exchange rate and Chinese GDP have no effect on US imports from China. About the exports, the exchange rate

and GDP are not sufficient to explain the change in the value of export, and there is a weak positive correlation between the independent variables and the value of export.

### Finally test

I think the reason for this result which I get is that I chose the data on an annual basis. The annual change in GDP is large, and the impact on imports and exports is also large. The imports and exports are about US. Therefore, I collected the Chinese imports from US, Chinese exports to US and other relevant data from spring 2015 to autumn 2019 on a quarterly basis and did the same analysis for them. I sorted out the data and got the following table.

Date	lnIM	lnEX	e	lnCHGDP	lnUSGDP
2015 Spring	-0.009311607	-0.017831919	0.160378599	-0.018641251	-3.06895E-05
2015 Summer	0.001018033	0.012598324	0.161188767	0.010874373	0.000234495
2015 Fall	-0.000503127	0.005616555	0.158643597	0.004328251	0.00040907
2015 Winter	0.007077087	-0.00333964	0.156474775	0.010534441	0.00028666
2016 Spring	-0.022812386	-0.022805363	0.152916513	-0.005379414	0.000274512
2016 Summer	0.004765496	0.011097477	0.152970257	0.011097464	0.000292106
2016 Fall	-0.00233513	0.01219734	0.150004488	0.004686038	0.000718885
2016 Winter	0.020732536	0.001627005	0.145995099	0.008952646	0.000427863
2017 Spring	-0.002502687	-0.017970059	0.145173557	-0.017650664	0.000293589
2017 Summer	-0.003076545	0.016282693	0.145784885	0.010985141	0.000775855
2017 Fall	0.001549151	0.008894702	0.149913316	0.004586467	0.000644833
2017 Winter	0.008873689	0.002960567	0.151261113	0.008815903	0.00059051
2018 Spring	0.000276395	-0.016712878	0.157392644	-0.017361407	0.004787618
2018 Summer	0.001362876	0.014359926	0.15660735	0.010762588	0.000885605
2018 Fall	-0.006861438	0.01001488	0.147019324	0.004333211	0.000680413
2018 Winter	-0.019400796	-0.002199134	0.144587328	0.008666912	0.000441568
2019 Spring	-0.011237731	-0.029764511	0.148157726	-0.017180622	0.000633924
2019 Summer	0.006548695	0.015234239	0.146578244	0.010453898	0.000484294
2019 Fall	0.004126708	0.003359637	0.142467757	0.004100176	0.000389168

Table 5

After data processing, this article made the same empirical analysis of the two models established before.

**Model (1)**

<i>Regression statistics (import)</i>		Table 6
Multiple R	0.463934	
R Square	0.215235	
Adjusted R Square	0.058282	
Standard Error	0.009705	
Sample Size	19	

According to table 6, the Multiple R and R Square are lower than 0.5. This means that the fitting degree of the regression model is low. The exchange rate and GDP are not sufficient to explain the change in the value of import, and there is a weak positive correlation between the independent variables and the value of imports.

**Model (2)**

<i>Regression statistics (export)</i>		Table 7
Multiple R	0.869395	
R Square	0.755848	
Adjusted R Square	0.707018	
Standard Error	0.00777	
Sample Size	19	

According to table 7, R Square and Multiple R is very close to 1. This means that the fitting degree of the regression model is very high. The exchange rate and the GDP of the two countries are sufficient to explain the change in the value of imports and that there is a strong positive

correlation between the independent variables which are exchange rate and GDP and the value of exports.

	<i>Standard</i>			<i>P-value</i>	<i>Lower</i>	<i>Upper</i>
	<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>		95%	95%
Intercept	-0.00671	0.048489	-0.13843	0.891739	0.11006	0.096639
e	0.023036	0.321397	0.071673	0.943809	-0.662	0.708076
lnCHGDP	1.161252	0.17453	6.653591	7.69E-06	0.78925	1.533254
lnUSGDP	1.667159	1.933985	0.862033	0.402241	2.45503	5.78935

Table 8

According to table 8, the P-values of e and lnUSGDP are more than 0.05 but the P-value of lnCHGDP is less than 0.05. It means that Chinese GDP has a significant effect on Chinese exports to US, but RMB exchange rate and US GDP have no effect on Chinese exports to US.

Combining these two tests, I get the following results. First, both Chinese GDP and US GDP can significantly affect Chinese exports to US. Second, neither of GDP and exchange rate has much effect on exports. Third, the effect of exchange rate on imports and exports is weaker than the effect of GDP. About the second result, the reason for it is that China has strict controls on imports.

## Conclusion

By constructing a regression model between import and export volume and exchange rate, and conducting an empirical study based on relevant data from 2008 to 2018, this article explores the mechanism of how RMB exchange rate fluctuations affect china-us trade volume. The empirical results show that the appreciation of RMB exchange rate will promote the increase of import and export volume at the same time, but because of its more significant impact on the import volume, the change of net export will show a decline.

Through the research in this paper, we conclude the following results:

1. The appreciation of the RMB and the growth of GDP will lead to an increase in Chinese imports from US, but the impact will be negligible. The reason why the impact is negligible is that China strictly controls the imports from other countries.
2. The depreciation of RMB and the growth of GDP will lead to the increase of Chinese exports, and the change of Chinese GDP will have a greater impact on Chinese export.
3. The exchange rate can affect the import and export, thus affecting international trade. But its impact on exports has been modest.

According to this research, RMB has recently depreciated, which means that Chinese exports will increase, but imports be controlled, so the Chinese net exports will increase. Based on the above analysis, China is in the midst of sino-US trade frictions. How to reduce the impact on Chinese export trade through trade means other than tariffs is worth our deep thinking.

According to the research in this paper, reducing the exchange rate of the RMB can boost Chinese exports, but this is negligible relative to the impact of Chinese GDP.

In summary, during the downturn of the economy, in order to avoid short-term shocks from deteriorating the domestic economy, maintaining a stable exchange rate is a policy objective worthy of attention.

There are still some unresolved problems that can be further explored in the future. For example, in the model of this paper, only the relationship among the data of exchange rate, import and export, and GDP of the two countries was studied and analyzed, but the overall international financial situation and domestic monetary policy were not studied.

### **Recommendations**

Supported by the findings and conclusions of this report, the following recommendations are offered in an effort to maintaining exports at export companies:

1. Always pay attention to the changes in China and the United States' policies on import and export trade. National policy is the most fundamental factor affecting trade. Regardless of recent trade frictions or China's stable imports, these conditions are directly caused by national policies. Therefore, in order to maintain a stable or even higher export volume, we must always pay attention to the relevant policies of China and the United States and make adjustments to ensure that the company is always in the perfect state.
2. Keep abreast of changes in the GDP of China and the United States. According to the results of regression analysis, GDP, especially China's GDP, has a huge impact on exports. Focusing on the development of GDP, we can infer the status of the export market and adjust the strategy according to this to achieve better exports.
3. Maintain sensitivity to fluctuations in the RMB exchange rate. In the short term, the change in GDP is small, at this time the exchange rate of the RMB has a greater impact on exports.

Pay attention to changes in the RMB exchange rate to avoid short-term shocks caused by the deterioration of the domestic economy.

4. Continue to produce excellent products of high quality. High-quality products are always needed. Therefore, the continuous production of high-quality excellent products can replace other factors affecting the export.

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