Is the exchange rate of RMB a major reason leading to Sino-American trade imbalance?

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We hereby recommend that the Project by Miss TSANG YEE WA entitled “Is the exchange rate of RMB a major reason leading to Sino-American trade imbalance?” be accepted in partial fulfillment of the requirements for the Bachelor of Social Sciences (Honours) Degree in China Studies in Economics.

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Is the exchange rate of RMB a major reason leading to Sino-American trade imbalance?

Abstract:

US government always condemns Chinese government to control the exchange rate of RMB, keeping it lower than the market exchange rate. Many U.S. politicians and some economists expect the revaluation of the RMB to be the solution to their trade deficit problem. However, some economist claimed this is not necessarily so. In actuality, the undervaluation of RMB is one of the reasons leading to the present trade deficit the US has with China, but there are other factors which exert influences on the bilateral trade balance between U.S. and China.
1. **Introduction and Literature Review:**

It is a persistent notion of United States that RMB is undervalued for many years as China has a huge trade surplus with the U.S. continuously. It has been perceived by some economists that the RMB is undervalued by about 15 to 35%. For example, Goldstein and Lardy (2003) stated that the RMB was undervalued by 15 to 25%. Jeffrey Frankel (2004) suggested that the RMB was undervalued by about 35% in 2000. Moreover, many of the U.S. politicians such as Senators Charles Schumer and Lindsey Graham expect the revaluation of the RMB to be the solution to their country’s trade deficit problem. Hence, the undervaluation of RMB has been believed that as the major contributor of Sino-American trade imbalance.

However, some of the economists He Weiwen (Co-director of the China-US/EU Study Center at the China Association of International Trade) and Daniel Ikenson (Associate director of the Center for Trade Policy Studies at the Cato Institute) claimed that this supposed linkage between the value of RMB and trade balance is not well proven. At the same exchange rate, China has trade deficit with other countries, such as Japan, South Korea and Taiwan. Obviously, the exchange rate is not the major reason for these changes as each country faced the same RMB.

Rick Harbaugh (2004) mentioned that the saving behavior of the Chinese is
the important factor leading to such huge trade surplus of China to U.S. Also, Martin Feldstein (2008) suggested that the national saving rate of Americans is the significant factor causing its trade deficit with China.

In the followings Yang and Besnainou (2006) stated the GDP per capita of China is still low compared to other developed countries due to the low labour cost, which make China have comparative advantage of being the World factory and gain huge trade surplus.

I will find out is the exchange rate of RMB the major reason leading to Sino-American trade imbalance and mention other factors leading Sino-American trade imbalance.

2. **Statement of problems:**
   a. How China control the exchange rate of China
   b. Reasons leading to revaluation of RMB
   c. Is the exchange rate of RMB the major reason leading to Sino-American trade imbalance
   d. Other factors causing Sino-American trade imbalance
   e. Will revaluation of RMB help to relieve Sino-American trade imbalance

3. **About the exchange rate of RMB**

   Renminbi (RMB) is legal tender in China and yuan is used as the accounting unit of it. During 1960s to 1970s, RMB was pegged to the U.S. dollar at 2.32
yuan per USD on average. After China implemented the policy of reform and openness in the 1978, the RMB was then devalued in order to enhance the competitiveness of Chinese exports. The official exchange rate of U.S. dollar to RMB declined from 1.50 yuan in 1980 to 8.62 yuan in 1994. In 1994, China announced the adoption of managed floating exchange rate system. The exchange rate of RMB rise slightly then. However, after the Asian financial crisis of 1997, Chinese government decided not to depreciate RMB which seem to manage it as a peg exchange rate system instead of “managed floating” exchange rate. Since 2005, the peg was finally lifted, which led to an immediate RMB revaluation to 8.11 per USD. Also, the exchange rate of RMB was permitted to float within a narrow band around a fixed exchange rate which determined by a basket of foreign currencies since 2005 which means that the Chinese government has started to increase the flexibility of the exchange rate.

In 2008, Chinese government pegged RMB to U.S. dollars as the global financial crisis sharply attack worldwide demand for Chinese products. This act

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1. Exchange rate of RMB per U.S. dollar - Data from World Bank
2. Exchange rate of RMB per U.S. dollar - Data from IMF
aims at maintaining the competitiveness of exports. Since financial crisis led U.S. economy into a big trouble, U.S. dollars was going to depreciate, RMB appreciation was halted through pegging with U.S. dollars. In 2010, China continued its previous policy (i.e. adoption of managed floating exchange rate system) of gradually moving up of the RMB.

The value RMB's official exchange rate has been claimed to be undervalued by about 37.5% when compared with its purchasing power parity. However, appreciation actions taken by the Chinese government and in recent years have caused the RMB to be within around 8% of its equilibrium value in 2012.

4. The mechanism of the fixed/pegged exchange rate system

China adopted a “managed floating” exchange rate that means the exchange
rate of RMB was based on market supply and demand of a basket of foreign
currencies. It is a kind of pegged exchange rate system. The basket of foreign
currencies include United States dollar, Euro, Japanese yen and South Korean
won, British pound, Thai baht, Russian ruble, Australian dollar, Canadian dollar
and Singapore dollar. The People’s Bank of China (PBOC) announced to widen
the daily trading band for RMB from 1% to 2% in March 2014, which means
that RMB can now be traded at 2% on the reference rate, which is set by the
PBOC each morning. This marks a large progress of liberalization and
internationalization of RMB.

Under the fixed/pegged exchange rate, the government peg or fix the
exchange rate at a certain level by intervening the foreign exchange system,
central bank is responsible for intervening to maintain the value of its currency
relative to the foreign currency. Revaluation and devaluation are similar to
appreciation and depreciation, but the former two are announced by the
government under the fixed exchange rate system. When there is excess
demand for foreign currency (surplus of domestic currency), the monetary
authority has obligation to sell foreign currency and buy domestic currency,
vice versa.
5. How China control inflow and outflow of RMB so as to control the exchange rate

Before 2009, there are strict government controls that prohibited almost all export of RMB or use of it in international transactions. Transactions between Chinese companies and foreign companies were generally in US dollars. As foreign companies were unable to hold RMB, no RMB could be flow outside China. It implies that the people of other countries cannot buy large amount of RMB to force RMB to appreciate.

The maximum annual exchange limit of Chinese and foreign citizens is 50,000 USD. (From RMB to foreign currencies or from foreign currencies to RMB) The applicant must presents his passport or his Chinese ID card in order to proceed the exchange at the relevant bank and. Also, the maximum withdrawal and purchase limit are 10,000 USD and 500 USD per day respectively. This rigid management of the RMB can control the demand for RMB and foreign currencies which is a major tool to keep the currency peg.

In 2009 the Chinese officials announced a pilot scheme. Under the Pilot Scheme, cross-border trade transactions between the approved areas of Mainland China and selected areas outside the Mainland were allowed to use RMB for settlement. At present, this scheme is extended to almost all of the

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provinces. For instance, Hong Kong, Macau and the ASEAN member countries have been specified as areas outside the Mainland that are covered by the Pilot Scheme. The aim of the scheme is promote the international trade between China and the rest of the world.

6. The reasons of revaluation of RMB

a. Economic pressure of RMB appreciation:

As China is a growing economy, the government introduced a lot of preferential policies to foreign companies such as lower profit tax in order to attract foreign investment. Also, there are lots of cheap labors and lands in China, so production cost of China is much lower than many developed regions. They hence moved their production lines to China. Consequently, many countries such as US, European countries would like to invest in China. Also, China exports huge amounts of goods to other countries. This implies that China has large current account surplus and received many foreign currencies. According to the data from the State Administration of Foreign Exchange China's foreign exchange reserves statistics of 2012, the balance of China's foreign exchange reserves reached $ 3.3 trillion in 2012. Since the

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6 2012 年中国国际收支报告 (3-4-2013). Retrieved March 1, 2014 from 国家外汇管理局, 国家外汇
majority of foreign exchange reserves are in U.S. dollars, there is a strong force for appreciation of RMB and devaluation of U.S. dollar.

b. **Political pressure of RMB appreciation:**

The main factor pushing China toward RMB appreciation is U.S. pressure. This point is demonstrated by the fact that China has appreciated the RMB only when the U.S. has threatened punitive measures.

For example, in February of 2005, Senators of United States introduced a bill demanding China must revalue the exchange rate of the RMB within six months. If China disagrees to do so, a 27.5% surcharge of punitive tariff will be imposed on all commodities China exports to the United States. Then, the People’s Bank of China implemented a managed floating exchange rate regime in July, 2005, which resulted in a 2.1% appreciation of the RMB.

When the People’s Bank of China widened the trading band of RMB which allow it to float against the U.S. dollar from 0.3% to 0.5% in daily movement, the threats of 27.5% tariff bill was reintroduce by United States. Some senators of United States have stated that they would not be satisfied with simply a 2% revaluation of RMB. Finally, under this persistent threat of U.S.

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Punitive tariffs, China was forced to appreciate the RMB respectively in 2007 and 2008. Consequently, RMB had been revalued by 21% against the dollar altogether.

With the onset of the global financial crisis in 2008, China experienced a slightly economic recession caused by decreased demand for Chinese exports. It implies that RMB need not to appreciate urgently under such economic recession. However, some senators require the U.S. Secretary of the Treasury to identify any country found to have a “fundamentally misaligned currency” in 2010 and call for imposing tariffs on imports from those countries. China was the major target. Consequently, the People’s Bank of China announced the reform of the RMB exchange rate regime and to enhance the RMB exchange rate flexibility which appreciated RMB by about 3% against the U.S. dollar at the same year.

Moreover, in October 2011, the Currency Exchange Rate Oversight Reform Act was passed by the Senate. Then, in 2012, China has allowed as most 1% in daily fluctuation of RMB value which has been up from the 0.5% limit set in 2007. Obviously, China has not ignored pressure from the U.S. government and responded by changing the policy of RMB.

The two countries became each other’s largest or second largest trade partner. In 1990, the total volume of their bilateral trade was small. For instance, U.S.’s export to China was about 1.2 % of total U.S. exports to the world and its import from China was about 3.06 %. However, the exports and imports grew to 7.1 % and 18.7 % in 2012 respectively. In 2012, U.S. trade deficit with China was reaching $315.1 billion. Under this situation, The US politicians always condemn it is mainly due to the undervaluation of RMB. Hence, they urge Chinese government to revalue RMB which could be the solution to their trade deficit problem. They expect that when the price of Chinese imports increase, the U.S. consumers will turn to buy local goods; when the price of U.S. exports decrease, more Chinese consumers will their goods.

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The Linkage between Currency Values and Trade balance

Some economists (He Weiwen, Co-director of the China-US/EU Study Center)
at the China Association of International Trade and Daniel Ikenson, associate
director of the Center for Trade Policy Studies at the Cato Institute) have
claimed that the linkage between Currency Values and Trade balance is not
well proven. Daniel Ikenson has raised some evidence so as to prove the
above the relationship between exchange rate of RMB and the Sino-American
trade balance is not closely linked. For instance, the RMB appreciated by 21 %
against the U.S. dollar from July 2005 to July 2008. On the other hand, the U.S.
trade deficit with China increased from $202 to $268 billion.
Furthermore, He Weiwen stated that the appreciation of RMB during the past
10 years did not bring about relevant trade balance changes no matter in
global trade or trade with the US. When RMB was pegged to the dollar at 8.28
during 1998 to 2004, China’s global trade surplus was actually small, ranging
from $22 to 32 billion. Ironically, during the period from 2005 to 2008, when
RMB floated and appreciated by 21.2% against the USD, global trade surplus
rise up sharply by 825% to $295.46 billion, opposite to the theory that
appreciation of a currency leads to a fall in that country’s trade surplus.
Throughout the period examined, the gap of trade deficit of U.S. to China
continued to widen, regardless of RMB was pegged to the dollar or not.
However, is it representative that the linkage between currency value of RMB and bilateral trade balance of U.S. and China is weak? It totally depends how you interpret the data. The economic theory is that when there is appreciation of a currency, the exports of that country will decrease and imports from other countries will increase which is also a kind of law of demand. This theory has still not been rejected and hence it is true to explain the real world. The paradox is that why the trade deficit of U.S. to China is getting more serious but the value of RMB keeps increasing. The value of RMB is only one of the reasons have influences on trade balance, there are other factors. Also, it is possible to see that if the value of RMB maintain at the same level, the trade deficit of U.S. to China will be much larger than what we can see now.

Moreover, it is better to separate the trade balance into two elements (i.e. exports and imports) and observe their changes.

In addition, I have found some proofs that appreciation of RMB has exerted a certain effect on bilateral trade balance between U.S. and China. For example, U.S. exports to China have out-performed exports to the rest of the world. From 1994 to 2012, U.S. exports to the world grew by 202% from $512.62 billion to $1,545.7 billion. However, U.S. exports to China grew by 1090%, increasing from $9.28 billion to $110.48 billion and the percentage growth
rate is more than 5 times to the world one. The above data prove the notion of revaluation of RMB relieving trade deficits of U.S. to China is true. Also, during 2005 to 2008, US exports to China grew 69%, while U.S. imports from China grew only 39%. These data implies that the growth rate of U.S. exports to China is much higher than average.

In short, it is wrong to assert that the relationship between the value of RMB and the trade balance is weak.

8. Other factors worsening the Sino-American trade imbalance

a. Producers absorb the increased costs

Pass-through means that when there is 1% change in the exchange rate results in a 1% change in the import price. Economist Cathy L. Jabara observed exchange rate pass-through is quite low although there is deprecation of an importing country’s currency, which will increase the price of imported goods. It is because most of foreign exporters are usually forced to absorb the increased costs in order to maintain market share. They tend to decrease the price of exports even if they have to lower their profits or


Markdown rates are determined by the demand curve and supply curve facing by the exporters. There are two situations according to Krugma (1987), when exporters facing high elastic demand curves that means if they raise a little on price, they will lose consumers easily as the consumers are sensitive to the price in this case. Hence, they will tend to reduce their markups in order to preserve market share. On the other hand, if an exporter facing few competitors and inelastic demand curve, most of them will choose passing-through the exchange rate change to maintain his profit. Therefore, it is possible for China to reduce the price and hence the trade deficit of U.S. to China did not show a shrinking trend after appreciation of RMB.

b. Reduction in production cost in China

Chinese exporters must lower the prices so as to keep their export prices unchanged. Actually, it is a completely rational response for the Chinese exporters to do so since the RMB appreciation reduces the cost of production for Chinese exporters - particularly those who rely on imported raw materials and components. It is because appreciation of RMB not only increases the purchasing power of Chinese consumers, it also makes Chinese producers

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11 Daniel J. Ikenson (22-4-2010). *China's Exchange Rate Policy and Trade Imbalances*. Retrieved February 15, 2014 from Cato Institute, Web site: 
become more competitive as the prices of their imported inputs in terms of
RMB fall, reducing the production cost. That reduction in cost can be
transferred to foreign consumers in the form of lower export prices. This could
counteract the intended effect of the appreciation of RMB (reducing U.S.
imports from China). This may be one of the reasons that even RMB
appreciated between 2005 and 2008, but the trade deficit of U.S. to China is
still not improved.

c. Elasticity of demand of U.S. on Chinese products
Price elasticity of demand (PED or Ed) is the percentage change in quantity
demanded of a good divided by the percentage change in its price. It
measures the responsiveness of quantity demanded of a good to a change in
the price of the good. Elasticity of demand of U.S. on Chinese products is
inelastic in a large extent that the quantity demanded changes by a smaller
percentage than the price does. In short, the quantity demanded of the
consumers in US would not drop sharply even there is appreciation of RMB.
Even if the price of Chinese exports increase, the consumers of US will not buy
the U.S. produced products due to the price still much higher than the Chinese
products. In fact, the Chinese exports to U.S. are generally low-end products
and the money amount of those products only occupies small proportion of
U.S. consumers’ income. However, they have a choice to buy the substitutes produced by other South-east Asian countries such as Thailand, Vietnam, Malaysia and so on, but the price of those substitutes may be higher than the Chinese products or the quality may not be as good as Chinese products. Furthermore, it may take time for consumers in U.S. to react to changes in price and switch to other substitutes. Hence, the demand for Chinese goods may become more elastic in the future.

d. Low GDP per-capita in China

Although revaluation of RMB will increase the purchasing power of the consumers in China, they can buy US products in a relatively cheaper price. This seems can narrow the trade deficit between US and China. However, there is one important point that some people may neglect. China is still a developing country, it is undergoing improvement in GDP per capita but its GDP per capita is still very low when compared with U.S. According to the data from National Bureau of Statistics of China, GDP per capita of China has increased from 381 yuan in 1978 to 38,449 yuan in 2012. However, in 2012, GDP per capita of US is 49,800 U.S. dollars. Using the exchange rate in 2012 (about 6.3124 yuan to 1 US dollar), GDP per capita of China is only about 6091 US dollars.\(^\text{12}\) It is such a large difference which implies that even the imports from U.S. are cheaper,

\(^{12}\) GDP per capita of U.S. and China - Data from World Bank
Chinese consumers still cannot afford of them. That’s why the Sino-American trade deficit has not been narrowed after the revaluation of RMB since 2005.

![GDP per capita of China and U.S. from 1990 to 2012](chart.png)

Source: World Bank

**e. High saving rate in China and low saving rate in US**

High saving rate in China implies that Chinese consumers are only willing to spend small proportion of their income on consumption, household final consumption expenditure is about 35% of GDP in 2012.  

In 2013, The People’s Bank of China released a study showing that China’s household savings rate has exceeded 43 trillion yuan months, compared with the rate of 20 trillion yuan of five years ago.

Moreover, China’s personal savings rate has become the world’s highest. At about 50 %, it’s well above the global average 20 % based on the latest figures.
from the IMF. Also, the gross national saving of China is 51% based on the data from the World Bank. There are several reasons causing this phenomenon. For recent economic situation in China, housing prices have soared in the past decades. For example, a square meter of a Beijing apartment costs about 30 thousand yuan, but the monthly income of a normal white-collar worker is about 5 thousand yuan. If they don’t save more, they could never buy a flat in the future as the problem of inflation is getting more serious.

Also, insurance and social welfare systems are still underdeveloped in China, particularly for those people who have rural “hukou”, so the motivation for precautionary savings is clearly strong. Chinese people fear unemployment which makes them cannot satisfy their basic needs without any savings. Also, credit markets are underdeveloped in China, younger consumers might not be allowed to go into debt for education, housing and other expensive goods, but rather have to accumulate such necessary funds first. As a result even young people might be the major savers. They save more because of the anxiety of unexpected expenses cannot be met by temporary indebtedness. For demographical reason, due to one-child policy and rise of incomes, birth rates begin to fall. When the generation of baby boom reaches retirement age, then baby boomers themselves have fewer children to support them in their old
age which gives an enormous incentive to save more. Affected by the Confucian thoughts, frugality is virtue which encourages the Chinese to save more. Hence, even if his or her income is expected to rise on average, they will not spend more proportionally.

On the other hand, the saving rate in United States is quite low. Personal Savings in United States is around 4.5 % which is reported by the U.S. Bureau of Economic Analysis. The national saving rate is 17% in 2012 based on the data from the World Bank. Also, the household consumption rate of Americans is quite high, about 69% of GDP in 2012. Also, there are well developed credits markets, social welfare and insurance systems in United States. The younger generations tend to spend more than their existing incomes through using credit cards.

When a country’s national savings is larger than its investment, it may become an exporting country, just what China does now. On the contrary, when the revered situation occurs, it may become the importing country like United States. That’s why the United States has such a huge trade deficits to China for a long time.

14 Household final consumption expenditure (% of GDP) of U.S. - Data from World Bank
f. Processing Exports of China

However, it is unfair of U.S. to condemn the low exchange rate of RMB leading to Sino-American trade deficit in a certain extent. It is because most of the export industries in China are processing exports of China that foreign countries shift their factories from home countries to China due to lower production cost, especially large pool of cheap labour. Processing exports account for about half of China’s trade volumes but are responsible for the entirety of its surplus.

China’s value-added operations still tend to be low-value manufacturing and assembly operations, thus the Chinese produced parts only occupy small
portion of the final value of Chinese exports and most of the final value of exports are imported raw materials. Most of the value of those imports comes from components and raw materials produced in other countries, including the U.S. Stanford University economist Lawrence Lau found that Chinese value-added only accounted for about one third of the total value of Chinese exports to U.S. in his 2006 paper. In 2008, the economist Robert Koopman, Zhi Wang and Shang-jin Wei, found the figure to be closer to 50%. That means although all the value of imports which are counted importing from China, at least 50% of that value is not value-added from Chinese enterprises. Instead, it reflects the efforts of workers and capital in other countries. China trade surplus with U.S. is mainly captured from the spillover trade surpluses of South Korea, Japan and Taiwan. Together, they rose from $30 billion in 2000 to more than $200 billion in 2010. This implies that China’s trade surplus with the U.S. were largely from these Asian countries.

Thus, the benefit from trade surplus of China is obviously overestimated by the United States. If Unites States still use the existing method which calculates the value of imports from China including the value of raw materials imported from foreign countries. The trade deficits would not be narrowed as long as these enterprises still operate in China.
g. Export control policies

U.S. has adopted some trade limitations to restrict exports to China. Actually, the export control policies are originated from political reasons. The U.S. Government controls exports of sensitive equipment, software and technology aim at promoting national security even China has a great demand on these high-valued products. As everyone knows, China is a communist country and U.S. is a capitalist country. U.S. usually stands at an opposition side to China in many political issues, such as dispute between Japan and China over Diaoyu Islands; dispute between Philippines and China over Spratly Islands; the sovereign problem of Taiwan. In the above issues, U.S. has claimed that it would assist those countries to fight against China, such as selling weapons to them. Also, China is an ally or a friend to most U.S.’s hostile countries such as North Korea and most of the Arab countries. This seriously threatened the national security of U.S. That’s why U.S. are unwilling to export those things to China.

h. U.S. – other Asian countries exchange rate (substitutes products from these countries)

Imports from China and other Asian counties such as Thailand and Malaysia are substitutes to each other. Theoretically, if U.S. dollars appreciate

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(depreciate) against to those currencies of these Asian counties, imports from these countries will increase (decrease) and hence the trade deficit to China will be narrowed (widened), other things being constant. In the following regression, I will use Thailand and Malaysia as the representatives of the exports’ competitors of China. It is because they export low-end products to U.S. which is similar to China. Also, their rankings are higher than other Asian countries such as Cambodia and Vietnam. In 2012, Thailand and Malaysia ranked 19th and 20th that are major exporting countries to U.S, U.S. imported 259.33 billion U.S. dollars and 261.08 U.S. dollars from Thailand and Malaysia respectively.  

9. Other factors affecting the Sino-American trade balance (improving the Sino-American trade deficit)

a. The rise of Chinese middle class

Some economists - Higgins and Klitgaard argue that the U.S. trade deficit with China will shrink in the future without significant RMB revaluation, due to the rapid expansion of China's middle class and their demand for higher-quality goods and services. They also claimed that the existing share of U.S. consumers on Chinese goods is already so high that the rate of growth of

Chinese imports will probably slow in the future. Since Deng Xiao Ping adopted the open door policy in 1978, he stated that let some people get rich first. The coastal regions have been developing at a faster pace than other regions of China, the people living there are richer than others. This policy gave birth to the middle class such as the capitalists, entrepreneurs and intellectuals. As mentioned above, China is undergoing improvement in GDP per capita which means that the purchasing powers of Chinese consumers rise. Their taste will change and demand less on the local products. Also, the mainland people have few areas to spend their money. For example, they cannot travel a lot of developed countries as they need to apply visa such as United Kingdom, United States and most of the European countries. This implies that most of their residual income will turn to buy goods in order to attain a higher living standard. They would tend to buy more foreign products including US imports than before as the quality and brand name of US products are much superior to local goods. In this way, US imports would increase relative to the Chinese exports to US, the gap of trade deficit of US and China could be narrowed.

b. China’s Entry into the WTO (Openness of China)
After China gain a membership of the WTO, international trade and
investment has increased sharply. After 30 years of the implementation of the policy reform and openness, China emerged from relative economic insignificance to become the world’s largest trading nation in 2012. In 1978, the total value of China’s trade was US$20 billion, 30th in the world but in 2012 it was $3.87 trillion. In order to enter the WTO, China has made a lot of commitments to open its market to foreign countries which may hurt the local industries of China. For example, China needs to reduce its tariff from 23.2% to 15% for agricultural goods; from 14.8% to 8.9% for industrial goods. Also, prohibitions, quantitative restrictions or other measures maintained against imports from China in a manner inconsistent with WTO Agreement would be phased out. Moreover, within 3 years after China’s accession to WTO, all enterprises will have the right import and export all goods and trade them throughout the customs territory with limited exceptions. In addition, China has to eliminate all export subsidies. All the above commitments that China has made will probably increase imports from United States which may narrow the trade deficits. After China’s accession to the WTO in 2001, US exports to China had increased by 114% from 2001 to 2005, compared with 49% in the five previous years.
c. Financial Crisis

The financial crisis of 2008 has had structural and institutional effects on U.S.-China trade and financial relations. As everyone knows, United States is the major market of China, most of the Chinese exports are consumed by the U.S. people. In 2005, 21.38% of Chinese exports were using U.S. as the destination. However, affected by the financial crisis of 2008, the sovereign debt and Euro crises, the economy of U.S. was seriously attacked. Also, many people were unemployed after 2008 in U.S. According to U.S. Bureau of Labor Statistic, the unemployment rate 5% in January of 2008 increased to 9.9% in December of 2009. Hence, a new world economic order may emerge that global demand pattern will be totally reversed. The consumers from United States tended to save more and consume less. Based on the data from Department of Commerce, Bureau of Economic Analysis of U.S., the gross personal saving rate increased from 2.6% in 2005 to 6.1% in 2009. Their reactions will probably reduce its massive trade while emerging markets and economies with large trade surpluses such as China may spend more, boost the value of their currencies, and reduce exports. Chinese exports which were using U.S. as the destination of 21.38% in 2005, was decreased to 9.2% in 2009.

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17 Data from Ministry of Commerce of the People’s Republic of China
destination declined by 3% from 2005 to 18.38% in 2009.

d. U.S. imposing anti-dumping duties on China’s imports

Dumping is when a company exports a product at a price which is lower than the price charged in its home market or below its production cost. Most of the countries take actions against dumping so as to protect domestic industries which are allowed by WTO agreement - General Agreement on Tariffs and Trade (GATT). U.S. has condemned Chinese industries dumping the goods to U.S. and hence it imposed lots of anti-dumping duties on Chinese imports. China ranks the first in the world which has been suffered from anti-dumping duties. In these anti-dumping cases against Chinese products, U.S. has occupied a large proportion regardless of the amount involved or the number of suspects. For example, according to "China Commerce Yearbook 2004" statistics, China's exports to the U.S. products were suffered 11 trade remedy investigations, of which 9 anti-dumping cases, involving up to 18 billion dollars in 2003. For example, in 1999, the U.S. Department of Commerce formally initiated its dumping investigation of apple juice concentrate imports from China. The dumping complaint alleges that China is selling apple juice to U.S.

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19 Volume of Chinese exports - Data from Ministry of Commerce of the People’s Republic of China
at prices 91% below its cost of production which hurts the U.S. domestic industry. Some of the Chinese apple juice producers decided to defend the suit of this anti-dumping case. Although China Won Final Verdict, U.S. still imposed 14.88% to 51.74%, import taxation rate to those Chinese apple producers. In 2010, U.S. imposed anti-dumping duties ranging from 30 % to 99 % on Chinese imports of steel pipes used in oil and gas wells. The U.S. Commerce Department imposed Anti-Dumping Duties of 31 % to 250 % on Chinese solar-product imports in 2012.

This may improve the trade deficit of U.S. to China. However, it is quite unreasonable to compare the price of Chinese goods to the U.S.’s since China is one of the countries that have the cheapest labor force. China is still a developing country, there are many infant industries and companies that are needed to protect and let them to grow in order to have enough power to compete with foreign companies.

10. Methodology

a. Data source

Data: From 1990-2012

The Sino-American trade balance = (US exports to China US - imports from China) is collected from the website of International Trade Administration, U.S. Department of Commerce. The exchange rate of RMB per U.S. dollar and the
exchange rate of other Asian countries currencies per U.S. dollar are collected from International Monetary Fund (IMF). Moreover, China GDP per capita, U.S. GDP per capita, China gross saving rate, U.S. gross saving rate are collected from World Bank. The consumer price indices (CPI) of mentioned countries are collected from Nation Master and World Bank.

b. Model

Double-log model is used.

\[ TB = EX - IM \]

\[ \log EX = \beta_0 + \beta_1 \log YC + \beta_2 \log SC + \beta_3 \log RRMB_US \]

\[ \log EX \text{ (WTO)} = \beta_0 + \beta_1 \log YC + \beta_2 \log SC + \beta_3 \log RRMB_US + D1 \]

\[ \log EX \text{ (FC)} = \beta_0 + \beta_1 \log YC + \beta_2 \log SC + \beta_3 \log RRMB_US + D2 \]

\[ \log IM = \beta_0 + \beta_1 \log YUS + \beta_2 \log SUS + \beta_3 \log RRMB_US + \beta_4 \log RTHA_US + \beta_5 \log RMAL_US \]

\[ \log IM \text{ (WTO)} = \beta_0 + \beta_1 \log YUS + \beta_2 \log SUS + \beta_3 \log RRMB_US + \beta_4 \log RTHA_US + \beta_5 \log RMAL_US + D1 \]

\[ \log IM \text{ (FC)} = \beta_0 + \beta_1 \log YUS + \beta_2 \log SUS + \beta_3 \log RRMB_US + \beta_4 \log RTHA_US + \beta_5 \log RMAL_US + D2 \]
where,

TB is the bilateral trade balance of U.S. to China

EX is the U.S. exports to China

IM is the U.S. Imports from China

YC is China GDP per capita

YUS is U.S. GDP per capita

SC is the gross saving rate of China

SUS is the gross saving rate of U.S.

RRMB_US is the exchange rate of RMB per USD

RTHA_US is the real exchange rate of Thai Baht per USD

RMAL_US is the real exchange rate of Malaysian ringgit per USD

D1 is China’s accession to WTO

D2 is Financial crisis of 2008

The definition and equation of real exchange rate is \( \text{RER} = \frac{e*P}{P_f} \), where e is the nominal exchange rate, Pf is the foreign price level and P is the domestic price level. In this study, consumer price indices are used to represent the price level for calculating the real exchange rate.

c. **Expected result:**

U.S. exports to China are affected by GDP per capita of China, the gross
national saving rate of China, the exchange rate of RMB per U.S. dollar U.S.,
China’s entry into WTO and Financial Crisis of 2008. Imports from China is
affected by GDP per capita of U.S., gross national saving rate of U.S., other
South-east Asian countries’ exchange rates in terms of U.S. dollar (e.g.
Thailand and Malaysia), China’s entry into WTO and Financial crisis of 2008.
For the regression of Log(EX), I expect that U.S. exports to China (dependent
variable) has positive relationship with GDP per capita of China and the value
of RMB but has negative relationship with gross national saving rate of China.
However, the variable of exchange rate of RMB per U.S. dollar may have
negative sign to the dependent variable since when there is appreciation of
RMB, the exchange rate of RMB per U.S. dollar will fall.
For the regression of Log (EX) (WTO), I expect after China accession to the
WTO, U.S. exports to China will increase due to the reduced trade barriers.
For the regression of Log (EX) (FC), it is supposed to have increasing trend of
U.S. exports to China as the global demand pattern has been believed to be
reversed.
For the regression of Log (IM), I expect that it is positively related to the GDP
per capita of U.S. and the value of Thailand and Malaysian currencies. On the
other hand, it is negatively related to the gross national saving rate of China
and the value of RMB. Nevertheless, the variable of exchange rate of currencies of Thailand and Malaysia per U.S. dollar may have negative signs to the U.S.'s imports from China (dependent variable) since when there are appreciation of Thai Baht and Malaysian ringgit, the exchange rate of currencies of Thailand and Malaysia per U.S. dollar will fall. Moreover, the exchange rate of RMB per U.S. dollar may have positive sign to the dependent variables just similar to what I explained above.

For the regression of Log (IM) (WTO), I expect that China’s accession to WTO has negative relationship with U.S. imports from China. It is because in the commitments, China had to reduce the subsidies on its exports which make Chinese goods more expensive and hence U.S. consumers decrease their quantity demanded on Chinese goods.

For the regression of Log (IM) (FC), after financial crisis, U.S. imports from China may decrease which implies that there is a negative sign of it.

However, they affect the exports and imports between China and U.S. in different extent, and this can be seen in the result of regression.
## The Result of Regression:

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<th>Dep. Var:</th>
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<th>LOG(EX)</th>
<th>LOG(EX)(WTO)</th>
<th>LOG(EX)(FC)</th>
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<td>(0.08693)***</td>
<td>(0.047253)***</td>
<td>(0.064857)***</td>
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<tr>
<td>LOG(SC)</td>
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<td>1.186632</td>
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<td>(0.376948)***</td>
<td>(0.287107)***</td>
<td>(0.267272)***</td>
<td>(0.222411)***</td>
</tr>
<tr>
<td>D1</td>
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<td></td>
<td>(0.068720)***</td>
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<tr>
<td>D2</td>
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<td>(0.184028)***</td>
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<td>Observations :</td>
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<td>R-squared:</td>
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<td>Adjusted R-squared:</td>
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<td>F-statistic:</td>
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<td>773.6641</td>
<td>665.5303</td>
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<tr>
<td>Dep. Var:</td>
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<td>LOG(IM)(WTO)</td>
<td>LOG(IM)(FC)</td>
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<tr>
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<td>--------------</td>
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</tr>
<tr>
<td></td>
<td>(1.40162)***</td>
<td>(1.492434)***</td>
<td>(1.768324)***</td>
<td>(1.572980)***</td>
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<tr>
<td>LOG(RRMB_USD)</td>
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<td>0.079384</td>
<td>0.060101</td>
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<td>(0.059667)***</td>
<td>(0.08814)</td>
<td>(0.091049)</td>
<td>(0.086506)</td>
</tr>
<tr>
<td>LOG(YUS)</td>
<td>3.984655</td>
<td>3.976799</td>
<td>4.029357</td>
<td>4.005522</td>
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<tr>
<td></td>
<td>(0.117576)***</td>
<td>(0.129348)**</td>
<td>(0.156331)***</td>
<td>(0.149422)***</td>
</tr>
<tr>
<td>LOG(SUS)</td>
<td>-0.428343</td>
<td>-0.241778</td>
<td>-0.327909</td>
<td>-0.271790</td>
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<tr>
<td></td>
<td>(0.199309)**</td>
<td>(0.178683)*</td>
<td>(0.202060)*</td>
<td>(0.188577)*</td>
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<tr>
<td>LOG(RMAL_USD)</td>
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<td>-0.104045</td>
<td>-0.233871</td>
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<tr>
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<td>(0.364538)</td>
<td>(0.279206)</td>
<td>(0.30910)</td>
<td>(0.289896)</td>
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<tr>
<td>LOG(RTHAI_USD)</td>
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<td>0.066842</td>
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<tr>
<td></td>
<td>(0.309122)</td>
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<td>(0.255439)</td>
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<tr>
<td>D1</td>
<td></td>
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<tr>
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<td>(0.061275)</td>
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</tr>
<tr>
<td>D2</td>
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<tr>
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<tr>
<td>AR(1)</td>
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<tr>
<td></td>
<td>(0.222455)</td>
<td>(0.23233)*</td>
<td>(0.234526)</td>
<td></td>
</tr>
</tbody>
</table>

Observations: 23, 22, 22, 22

R-squared: 0.997568, 0.998517, 0.998611, 0.998530

Adjusted R-squared: 0.996853, 0.997924, 0.997916, 0.997794

Durbin-Watson stat: 1.354575, 2.030868, 1.829689, 2.111391

F-statistic: 1394.646, 1683.212, 1437.385, 1358.222

Notes: AR(1) is used to correct the autocorrelation problem of the model

Standard error are given in parentheses

*** indicates significance at 1%;

** indicates significance at 5%;
e. Empirical result and analysis:

Both equations of Log EX and Log IM show the relationship among bilateral trade between U.S., China, China and U.S. GDP per capita, saving rate of U.S. and China and exchange rates. Most of the coefficients are consistent with the expected signs and statically significant. The adjusted R-squared are significant with the figures 0.993251 and 0.997924. Moreover, I add two dummy variables (China's accession to WTO and Financial crisis of 2008), the adjusted R-squared are significant with the figures over 0.99.

Double-log model is being used in this report that means if the independent variable increases by 1%, the dependent variable will increase by 0.78%.

(Using the example of LOG (YC) in the regression of LOG (EX))

In the equation Log EX, the log value of U.S. export to China is the dependent variable. Most of the coefficients are significant with expected sign, but the gross national saving rate of China has positive relationship with the dependent variable which contradicts to what I expected. It is a very interesting result, maybe when the income increases, the Chinese tend to save more but the amount of money left for consumption also rises at the same time. On the other hand, it is reasonable to see that the GDP per capita
of China leads to a higher U.S. export to China as what I mentioned before due to the rise of middle class in China. Moreover, the exchange rate of RMB per U.S. dollar shows a negative relationship with the dependent variable which is also logical to see that rise of the value of RMB increased the value of U.S. export to China.

In the equation Log (EX)(WTO), D1 is statistically important and have positive relationship with the dependent variable just like what I have expected. However, the influence of RMB of this regression on trade balance is reduced as it seems a compensation of adding more variables. When the Chinese economy become more open, the export should increase and this may weaken the effect of the role of RMB on widening the trade deficit.

In the equation Log (EX)(FC), D2 shows its statistically importance, but it has a negative relationship with the dependent variable which contradict to what I expected. The possible reason is that when the unemployment of U.S. increase and the products they produced declined. Then, their exports to other countries fell, including China.

In the equation Log IM, the dependent variable is the log value of U.S. import from China. Most of the coefficients with expected sign but only few of them are statically significant. Firstly, the GDP per capita of U.S. shows a positive
relationship with the U.S. import from China with statistically significance.

Then, the gross national saving rate of U.S. people is negatively related to the dependent variable shown in the regression which satisfies my expectation.

Moreover, the regression shows that there is a positive relationship between the exchange rate of RMB per U.S. dollar and the value of U.S. import from China, but it is not highly statistically significant. It may because the prices of exports of China to U.S. only occupy a small proportion of U.S. consumers’ income and hence their demands for Chinese goods are inelastic which is proved in the regressions that the coefficient of RRMB_USD is smaller than 1.

However, both the exchange rates of Thailand and Malaysian currencies are supposed to have same signs (negative signs) with the dependent variable but there are some differences shown in the regression. Malaysian Ringgit satisfies the expected condition above but Thai Baht is not. Nevertheless, both of them are not statistically significant to the dependent variable which means that there is weak linkage between the value of Asian countries’ currencies and U.S. import from China. The goods from those Asian countries are not the perfect substitutes to those from China.

In the equation Log (IM)(WTO), the significance of this dummy variable (China’s accession to WTO) is not important at all although it shows a negative
sign in the result of regression. It may because China’s accession to WTO mainly affects the openness of China which means that China exports have been welcomed by U.S. with less trade barriers. However, China set a lot of trade barriers to other countries’ imports before joining WTO. Hence, it is not a significant factor to U.S. imports from China relatively.

In the equation Log (IM)(FC), the dummy variable of financial crisis shows a negative relationship with the dependent variable that satisfies my expectation but it is not statistically important. Since U.S. people are poorer than before due to the financial crisis and the imports from China are generally low-ends products, they still relied on them as the prices of Chinese products are low. Consequently, they had not reduced demand on Chinese imports sharply.

The effects of China controlling the exchange rate of RMB on bilateral trade balance between U.S. and China has always been a heated debate. In the regressions’ results, the equation of Log EX shows a negative sign of RMB which means that appreciation of RMB will increase exports to China. The equation of LOG IM shows a positive sign of RMB which implies that appreciation of RMB will decrease the imports from China. Hence, the bilateral trade imbalance will be improved if RMB is revalued. But is it a most
important factor leading to such trade imbalance, it seems not since in the equation of Log IM, RMB is not very statistically significant. On the other hand, GDP per capita of both U.S. and China in both equations show their strong linkage with the trade balance. Hence, it is correct to say that the value of RMB is one of the reason but not the most important factor affecting the trade balance between U.S. and China.

f. Limitations of the model:
This model does not include all the variables that I mentioned above like anti-dumping duties and the export control policies of U.S. as it is too complicated to add all these variables in the model. For example, it is difficult to quantify the anti-dumping duties and the export control policies of U.S. in order to do the regressions.

Moreover, there are some differences of bilateral trade balance’s official data between U.S. and China. There may be concealment of both U.S and China which means that the data I mentioned above may not be accurate. Therefore, the variables of the regressions are not enough to explain the conditions of bilateral trade between U.S. and China.

11. Conclusion:
China controlling the exchange rate of RMB has long been considered as a major reason leading to trade deficit of U.S. to China. However, it is only one
of the factors causing the trade imbalance but not the most important one.

Also, saving rate are not strongly correlated with the trade balance. Based on the results of regressions above, GDP per capita of both U.S. and China seem the most important reasons causing such trade imbalance.

The other factors affecting the trade balance I have already mentioned above clearly such as GDP per capita and saving rate of both U.S. and China; financial crisis of 2008; China’s accession to WTO and anti – dumping duties. However, they are still not the full pictures behind the trade imbalance between U.S. and China, there may still be other factors causing such situation that are omitted.

**Appendices:**

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<th>Year</th>
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Source: World Bank
Gross savings (% of GDP)

Gross savings are calculated as gross national income less total consumption, plus net transfers
(World Bank national accounts data, and OECD National Accounts data files)

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<th>Years</th>
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Source: World Bank
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