The Dynamics of China’s Trade Composition and Trade Balance - A Comparison Across Partner Countries

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1. Introduction

“For so many countries around the world, China is becoming rapidly the most important bilateral trade partner,” O’Neill, chairman of Goldman Sachs’s asset management division and the economist who bound Brazil to Russia, India and China to form the BRIC investing strategy, said in a telephone interview. “At this kind of pace by the end of the decade many European countries will be doing more individual trade with China than with bilateral partners in Europe.”

In the past few decades, China has assumed a significant role within the global trade atmosphere and continues to integrate itself. China became the world’s top exporter in 2009 and the world’s largest trading nation in 2013, surpassing the U.S. (measured by the sum of exports and imports of goods). China’s trade reached $4.2 trillion by the end of 2013, a 7.6 percent increase from the previous year. Specific attention has been paid to China’s trade surplus and growth ever since China opened its economy and increased its accessibility by joining the WTO in 2001 – as a result, in this past decade China has seen economic growth the range of 8-9 percent.

China’s global trade balance began its upward trend and surged between the years of 2004 and 2007, as shown in figure 1. However, post-financial crisis, the reduced global demand led to a logical decline in the demand for Chinese exports. Nevertheless, China still continues to build a large trade surplus with the rest of the world.

![Figure 1. China's Total Trade Balance](image-url)
China’s growing market share of exports to the rest of the world has become a subject of controversy and has sprung accusations that the renminbi (RMB) is artificially low manipulated by Chinese monetary policy. This argument seeks to explain China’s large trade surplus through the following channel: a lower Chinese exchange rate makes Chinese goods relatively cheaper than foreign goods. As such, Chinese goods become more attractive and increase Chinese exports relative to its imports.

In examining this issue, the publications of Wang and Wan (2008), Li Wen (2011) and Herrero and Koivu (2007) have studied China’s trade vis-à-vis the rest of the world at the aggregated level, while others such as Yu (2009) and Cline (2010) have focused on the bilateral trade relationship specifically between China and the United States. These papers used econometric method to measure the determinants of trade balance from the U.S. perspective. In regards to China’s trade relationship with the European Union and India, research conducted by authors such as Dattmer et al (2009), Hinloopen et al (2004) focused on the dynamics of structural change of China-EU trade and Panagariya (2006) examined on India–China trade composition and foreign investment. These papers analyzed trade pattern and comparative advantage of trade.

The latter relationships (between China and EU/India) have not been examined empirically with as much detail and depth as the one between China and the United States. Conversely, no research to my knowledge has examined the structural change of China and the United State trade. Therefore, considering my interest in the development of China’s trading policies, I would like to provide a complete analysis on
the dynamics of China’s trade balance and composition with its major trading partners i.e. the United States, the European Union and India looking at both the econometric analysis and the structural change.

Provided the goal of this thesis in mind as stated above, I want to depict China’s individual trade relationship with USA, EU and India to set the background knowledge for this thesis – here are a few highlights of each relationship:

China/US:

a) China has expanded its trade substantially with the US in the past decade. The total China-U.S. trade balance rose 2500 percent in the 14 years spanning from 1999 to 2013.

b) The United States is China’s largest trading partner and its largest market for its exports.

c) Figure 3 shows the trade pattern: China–U.S. trade rose rapidly from 2.12 percent of China’s GDP in 2001 to 5.33 percent in 2006. With the onset of the financial crisis, China-U.S. trade balance fell sharply to 2.88 percent of China GDP in 2009 and grew at a sluggish pace until 2013.

d) The size of US-China trade imbalance has become the largest for the U.S. when compared to US’s other bilateral relationships.

China/EU:

a) China’s trade with the European Union has grown at a steady rate and China has built a large bilateral trade surplus with the European Union. China’s trade surplus with EU increased 2.1 percent from previous year to 559.1 billion US dollars in 2013.

b) China is the EU’s biggest source of imports and is becoming the EU’s fast growing export market.

c) Figure 3 shows the trade pattern: trade balance between China and the EU rose until 2007 and then plummeted following the onset of the global financial crisis.

China/India:

a) China has become India's largest trade partner and India is China's seventh largest export destination.
b) Chinese accession to the World Trade Organization (WTO) has further underlined the potential of the Chinese market.

c) Figure 3 shows the trade pattern: China was in trade deficit with India during 2003 and 2004. With trade liberalization from both countries, China started to gain a trade surplus with India from 2005 onwards.

A major concern among policy makers of partner countries has been the magnitude of the trade imbalance with China. The media has portrayed trade relationships with China as unbalanced and a factor that deteriorates the domestic country’s economy. This is one interpretation of the current trade balances with China, however there may exist others – which this paper will address and reflect upon. As such, I wish to diagnose what factors have contributed to the bilateral trade imbalance (shown in figure 3) between China and its major partner countries by analyzing the composition and determinants of trade.

![Figure 3. China’s Trade Balance vis-a-vis Major Trading Partners](image-url)
The rest of the paper is outlined as follows. Section 2 describes the relevant academic literature on the nature of the bilateral trade and determinants of China’s trade balance between China and its major trading partners. Section 3 presents the approach and methodology. Analysis of trade patterns and main estimation results are presented in section 4 and 5 with section 6 concluding the paper.
2. Literature Review

2.1 Composition of Imports and Exports

Researchers have looked at the composition of imports and exports in China with various approaches and methodologies. Much of the literature analyzes the pattern of trade using empirical macroeconomics methods to measure comparative trade advantage while others used a more theoretical approach to tackle the problem.


There were also a few theoretical papers that evaluated the issue of China – EU trade composition and pattern. Erixon et al (2009) examined China’s overall trade policy since its accession to the World Trade Organization as well as trade balance, current account balance and foreign direct investment patterns. The paper also looked at China’s trade-related reforms outside the WTO, especially unilateral measures and preferential trade agreements (PTAs). It highlights challenges for China’s trade policy in domestic reforms, in WTO, in PTAs and in its bilateral relationship with the USA and EU.

The revealed comparative advantage (RCA) has been used to study trade composition. The indicator is specified as follows:

\[
RCA_i = \ln \left( \frac{X_i / M_i}{\sum_i X_i / \sum_i M_i} \right)
\]

The concept of revealed comparative advantage, originally introduced by Balassa (1965), is based on the theoretical consideration that a country will specialize in producing goods for which it has a
comparative advantage based on its technological (Ricardo) or relative factor endowments (Heckscher-Ohlin). The indicator represents a country’s share of exports in industry i relative to its share of imports in the same industry - an RCA greater than zero illustrates a comparative advantage and vice-versa.

Starting from the period between 1970-1997, Hinloopen et al (2004) presented the evolution of Chinese trade vis-à-vis EU. China initially specialized in exporting primary products to a large extent until 1985 when it hit a peak of 58.6 percent of total exports. After 1985, exports that were primary products started declining and China lost its comparative advantage in 1992 measured in RCA. China’s share of unskilled-labor intensive export increased particularly after 1985, i.e. 5 years after the Economics Reform policies reflecting its comparative advantage in unskilled-labor intensive products from 1970 - 1997. Likewise, the development of technology intensive exports in China was stable until 1985 and increased rapidly after 1985. Though the development in human-capital intensive products was rather flat from 1970 – 1985.

In the more recent period of 1999 - 2008, Dattmer et al (2009) analyzed the evolution of the trade pattern between China and the EU–27 from EU’s perspective. They argued “the structural change of the Sino European trade pattern is affected by the integration process of the Chinese economy into the world market”. China is adding more value into traded goods because it has shifted its focus to technology intensive goods. While remained as the major labor-intensive goods’ exporter China is expanding its market share in technology-intensive industries. Dattmer et al (2009) illustrated EU–27 had a comparative disadvantage in labor-intensive good against China, though this disadvantage has been reduced over time. They found that the import of labor-intensive goods from China, measured to be 30.1 percent in total trade in 2008, was more than twice the level of imports in total external trade. However, the import share of labor-intensive goods from China decreased 9.3 percent from 1999 to 2008 indicating China is slowly decreasing its trade in labor-intensive goods. Dattmer et al (2009) found that the European Union maintained its comparative advantages in immobile technology intensive goods, which were harder to imitate and were the main exports of EU-27 to China. However, this advantage measured in the RCA-indicator decreased by half from 0.6 points in 1991 to 0.3 points in 2008. In total external trade of technology-intensive goods, EU-27 held a slight increasing trend of competitiveness.

Looking into EU-China commercial relations, Erixon et al (2009) found that China has established comparative advantage in low-tech, labor-intensive manufacturing goods. They argue that the EU is not justified to target the bilateral current-account deficit and the RMB exchange rate even though EU’s trade deficit with China has increased more than threefold from 2001 to 2006 because the trade deficit with
China is negligible when compared to the EU’s overall deficit. As a second note, the EU’s trade deficit with the rest of the world has decreased. Although authors acknowledge that there are market complaints from both EU and China conceiving their trade relationship.

2.2 Determinants of China’s Trade Balance

There are several studies that focus on the determinants of China’s trade balance with its major trading partners, however there are a few different approaches represented. Most of the studies examined the issue using econometric methods while a few did not. Wang and Wan (2008), Li Wen (2011) and Herrero and Koivu (2007) studied China’s trade at an aggregated level, while Yu (2009) and Cline (2010) focused on the bilateral trade between China and the United States. All the afore-mentioned studies used econometric approaches to study trade, while Katie (2013), Makin (2006), Feenstra (1998) and Moosa (2012) looked at the determinants of trade theoretically. Katie (2013) conducted a survey study on Chinese officials and relevant personnel working in US embassy in China. Makin (2006) looked at the balance of payment framework for analyzing trade balances and monetary flows in China. Feenstra (1998) utilizes the concept of saving-investment using a macroeconomic identity. Moosa (2012) analyzed macroeconomic indicators for US-China trade one by one.

The variables that have been highlighted typically include real effective exchange rate, GDP growth and time. In the next section, I am going to discuss how each variable affects the trade balance. The list of specifications the econometric studies have used is provided in Appendix A.

2.2.1 Exchange rate

The effect of exchange rate adjustment on trade balance has been extensively studied. A depreciation of the domestic currency increases the domestic currency price of imports and reduces the foreign currency of exports. Consequently, the demand of imports fall and the demand of exports rise, which results in an improvement of trade balance for the domestic country. The idea of trade imbalance as excess demand for foreign exchange is based on the assumption that the demand for exports and imports are sufficiently elastic. The Marshall-Lerner condition defines “sufficiently elastic” as the sum of the elasticity of demand for imports and exports being greater than 1 (Marshall, 1923; Lerner 1994). If the elasticity statistic satisfies the Marshall-Lerner condition, domestic currency devaluation or depreciation would lead to a fall in the demand for imports and a rise in the demand for exports, and consequently to improvement in the trade balance. Alternatively, the demand for imports and exports may not be
responsive at the original period of depreciation. The value of exports may decrease and the value of imports may increase immediately following domestic currency depreciation. These make exports cheaper and imports more expensive and leads to a deterioration of the trade balance at first. This is the J-Curve effect (Magee, 1973).

Most econometric papers found that real effective exchange rate has a significant negative effect on trade in China while one paper found no effect. Yu (2009), Cline (2010), Herrero and Koivu (2007), and Wang and Wan (2008) found that the appreciation of RMB would reduce the trade deficit of its partner countries’ to China. Yu (2009) finds that the revaluation of RMB against the U.S. dollar reduces China’s exports to the United States. Cline (2010) measured trade with two forms of REER in two regressions. He first estimated bilateral trade with the lagged REER and calculated it to be equal to the average of the level REER in the two previous years. For the United States, a 10 percent real effective appreciation of RMB is found to cause a reduction in the bilateral US deficit by 0.37 percent of US GDP, or $54 billion at 2010 scale. He then estimated the effect of percentage change in the lagged bilateral real exchange rate on change of bilateral trade from previous year. For the United States, a 10 percent real effective appreciation of RMB causes a reduction in trade balance of 0.282 percent, or $41 billion. Herrero and Koivu (2007) found strong evidence that a real appreciation in the RMB reduces exports in the long run for both processed exports and ordinary exports from 1994 to 2005, as well as reducing imports following China’s accession to WTO. However, the overall impact of exchange rate policy on trade is relatively small due to the decrease in both imports and exports. One possible reason for the small overall impact is the way the variables are measured. The real effective exchange rate is measured in the current year, whereas it would be more appropriate to calculate real effective exchange rate in a lagged year. Companies and consumers cannot reflect on change in real effective exchange rate immediately.

Wang and Wan (2008) found that real effective exchange rate has a significantly negative relationship on China’s overall trade surplus, which is expected given theory. However, when effects are estimated separately for exports and imports they found a significant positive sign indicating that the devaluation of RMB would increase exports of China. The author mentioned that the unexpected sign is due to the fact that the volume effect dominated the price effect, but didn’t explain why export volume rises when real effective exchange rate appreciates. A possible explanation for this is that the skill composition and technology intensity of traded goods are advancing in China. When this happens the effect of the conventional measure of real effective exchange rate is not appropriate for the measurement of China’s trade balance. The other explanation can be the measurement of price. Consumer price in
China has been used to calculate the relative price index. However, not all goods are tradable goods in China. The general price level is not a good proxy of relative prices of traded goods sector. It would be preferable to calculate real effective exchange rate using relative unit labor costs in tradable sectors instead of relative price. Li Wen (2011) found that appreciation of RMB would not have significant impact on the balance of trade.

Moosa (2012) thinks that the widening of the U.S. – China trade balance is due to an income effect since the recession associated with the global financial crisis reduced imports. He argued that Cline’s argument is “an ideologically driven distortion backed by flawed economic analysis.” He argues that the RMB/dollar exchange rate does not affect trade balance since during 2005-2008 the trade deficit widened as RMB strengthened. Moosa argues that Cline fails to recognize the effect of the Great Recession on imports following the global financial crisis. However, the problem with Moosa’s observation is that he looked at the bivariate relationship of trade and exchange rate. He didn't have quantitative variable controls nor did he test his findings. In addition, he looked at nominal effective exchange rate instead of real effective exchange rate. Since RMB was pegged to USD from 1997 to 2005 the nominal value of exchange rate cannot reflect the competitiveness of China.

Feenstra et al (1998) demonstrated that the major cause of China’s trade surplus is its high household saving rate. He studies the saving-investment balance by dividing the Chinese economy into three sectors, the private sector, state-owned enterprises and the. In the conventional macroeconomic identity, the sum of the saving-investment balances of the three sectors is equivalent to the trade balance. It is argued that “the primary determinants of the overall trade balance are macroeconomic and structural in nature, and they work through saving and investment behavior”. The high savings rate in China is attributed to “China’s demographic profile, the absence of social insurance for the bulk of the population, and the post-1978 appearance of investment-motivated saving in response to the scarcity of formal financial intermediation to finance the investment of the non-state sector”. Feenstra et al. (1998) explain the widening of the US-China bilateral trade deficit as a result of opposing macroeconomic forces in the US and China, causing their respective overall trade balances to move in opposite directions; and the accelerated relocation of production of US imports from East Asia to China.

Feenstra et al. (1998) suggest that a revaluation of RMB would reduce the US deficit “by lowering the private saving rate because the rise in the purchasing power of domestic wealth would reduce the amount needed to be saved in order to make the required purchase”. “The investment spending could also increase because the decline in the price of imported capital goods would allow more investment projects
to be implemented sooner”. However, this argument makes the assumption that Chinese private saving goes to consumption of foreign goods.

In the paper China’s growing trade surplus: causes, consequences and policy implications, by Makin (2006) illustrates that the trade surplus of China is due to China’s pegged exchange rate. With China’s surging output growth relative to expenditure, “the increase in import demand from China’s trading partner is satisfied by higher exports from China”. If RMB is not pegged to USD, it would appreciate the nominal value of RMB and depreciate the currencies of trading partners. Makin argues that “an exchange rate adjustment would automatically ensure the trade accounts of the two regions remained in balance” and China pegged the RMB to prevent losses in competitiveness of Chinese exports. However, since Makin (2006) also looked at nominal exchange rate instead of real effective exchange rate. Nominal exchange rate is not a correct measurement for exchange rate because it moves with inflation. Therefore, his argument is invalid.

A survey was recently conducted among the US embassy in China, People’s Bank of China and China’s Ministry of Commerce to assess the impacts of Chinese exchange rate on US-China trade. Katie (2013) found that “the respondents from the United States embassy in China were majorly accusing China of manipulating its currency which results in trade deficit between China and the United States”. However, the survey showed that most of the respondents don’t think it is feasible for a radical change given the present Chinese policy on exchange rate. Katie (2013) suggest that (i) “a new currency system may not allow flexibility for the Chinese officials to adopt a credit and monetary policy that is market based”; (ii) “new currency system could destabilize the Chinese promotion strategies for export and destabilize the financial system in China”. The majority of responses reflect that China is not committed to playing an important role in global financial stabilization and raises doubts on China’s willingness to adopt an exchange rate policy that will be less instructive.

2.2.2 Growth

The GDP growth of China and its trading partners are important determinants of trade. An increase in world income is likely to boost Chinese exports, leading to a rise in Chinese trade surplus. While an increase in Chinese income will lead to a rise in Chinese imports and therefore decrease Chinese trade surplus. Most papers have growth as a determinant of trade and find it significant such as Wang and Wan (2008), Yu (2009), Cline (2010) and Li Wen (2011). Wang and Wan (2008) specified growth as $LN(\text{Chinese income})$ and $LN(\text{World income})$. Yu (2009) specified growth as log GDP of U.S. and log

Wang and Wan (2008) found that both change in Chinese income and the income of world are important determinants of China’s trade surplus. Chinese income is estimated by GDP volume of China and world income is estimated by average GDP of industrial countries. Yu (2009) suggested that an increase in U.S.‘s growth helps to increase bilateral trade between China and the United States. Regression results have shown that U.S. growth is positive and statistically significant at the 5 percent level. He used log GDP of China and log GDP of U.S. as measurements of growth in China and the United States. Finally, William Cline (2010) found that an increase of 1 percentage point in the excess of China’s growth rate over that of the United States increases the US bilateral trade balance with China by 0.045 percent of GDP, or $6.6 billion. He measured growth as the difference between China’s growth rate and the U.S. growth rate. Nevertheless, Herrero and Koivu (2007) found the effect of world demand on Chinese exports to be insignificant in their sample; the same insignificance found with China’s domestic demand on Chinese imports. This is because the sample period of their data is from 1994 to 2005, prior to China entering WTO. China was facing enormous barriers to other countries’ market before WTO entry. One possible explanation for insignificant domestic demand is China’s growth was export driven and external demand was the major determinant of Chinese trade balance.

2.2.3 Time

Only William Cline’s study included a time trend in his econometric regression. The time trend reflects the impact of all the other variables, which impact trade balance, and might be correlated over time. One explanatory factor of a positive time variable is the increasing skill and technology intensity of exported goods from China, as I mentioned previously. China’s exports are climbing up the skill ladder and may contribute to the increase in exports.
3. Approach & Methodology

My approach and methodology to study the bilateral relationship between China and its trading partners can be divided into three parts. First, I will look at the composition of exports and imports between China and its trading partners. Trade will be categorized into different levels of labor skills and factor intensities based on SITC 2 digit. I will analyze the evolution of trade using the revealed comparative advantage index (RCA).

Second, following William Cline’s methodology I will test if real effective exchange rate, growth difference, Financial Crisis, RCA and time affect China bilateral trade. The regression is expressed as follows and the signs are hypothesis with respect to each variable:

\[ TB = f(\text{REER}, \text{GDIF}, \text{FinancialCrisis}, \text{HighSkillRCA}, T) \]

\[ \quad - - - + + \]

The detailed description of variables that I have employed in this model are listed below:

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>( TB )</td>
<td>China bilateral trade balance with individual trading partner as a percent of Chinese GDP</td>
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<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLES</th>
<th>DESCRIPTION</th>
<th>HYPOTHESIS</th>
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</thead>
<tbody>
<tr>
<td>( \text{REER} )</td>
<td>China’s Real effective exchange rate with the EU</td>
<td>Negative</td>
</tr>
<tr>
<td>( \text{GDIF} )</td>
<td>China’s growth rate minus the EU growth rate</td>
<td>Negative</td>
</tr>
<tr>
<td>( \text{FinancialCrisis} )</td>
<td>Dummy variable for recession years (1999-2008 = 0; 2009-2011 = 1)</td>
<td>Negative</td>
</tr>
<tr>
<td>( \text{HighSkillRCA} )</td>
<td>RCA index for high skill goods</td>
<td>Positive</td>
</tr>
<tr>
<td>( T )</td>
<td>Time trend (from 1999 = 1 to 2011 = 12)</td>
<td>Positive</td>
</tr>
</tbody>
</table>
Third, I will compare and contrast the dynamics of China trade with all three major trading partners i.e. USA, EU and India. Within EU trade, I am going to divide the EU into old and new EU member states and conduct the above two measurements (regression and indexes) for each, since the European Union has been growing since 2004 and the nature of these economies is different. In order to understand whether trade is driven by the demand in the new member states or in old member states, I will also compare the trade evolutions of the old EU member states and the new EU Member States.
4. The Dynamics of China Trade Composition

Our analysis focuses on the dynamics of the labor skill distribution of trade. The IMF, using the Standard International Trade Classification, classifies the labor skill distribution of trade. The SITC specifies merchandise goods into sectors detailed in digits. There are ten 1-digit sectors (0-9), each subdivided in ten 2-digit sectors. This section will first exam the dimension of trade followed by the composition of trade and finally investigate the comparative advantage of composition of trade.

4.1 China - U.S.A. Bilateral Trade

As the largest source of exports to the U.S., China has increased its exports to the U.S. from 3.9 percent of China’s GDP in 1999 to 7.5 percent in 2006 according to figure 4. While Chinese imports to the U.S. to GDP ratio was relatively stable around 2 percent from 1999 to 2011, the trend of trade balance is mainly driven by the fluctuation of exports to the United States. The largest share of exports from China to the U.S. is low-skill labor goods, and accounted for 37 percent of total exports to the U.S. in 1999 as shown in figure 5. Though it remains its largest share, the market share of low-skill labor goods has decreased – replaced by a corresponding increase in the share of high-skill labor goods. There was a jump in the share of high-skill goods exports from 14 percent to 22 percent between 2001 and 2003, followed by a steady and slow increase until 2011. The share of medium skill blue-collar exports to the U.S. decreased while the share of medium skill white-collar exports to the U.S. increased from 1999 to 2011.

The trend presented in figure 5 shows China’s exports to the U.S. is shifting away from low-skill labor goods to high-skill labor goods. Interestingly, according to figure 6, half of China’s imports from the U.S. were medium skill white-collar in 1999 yet the share has decreased to 40 percent in
2011. An increasing share of low-skill imports from the U.S. fills this gap as shown in

Figure 4. Exports-Imports of China-U.S. Trade

Figure 5. China-US Exports Labor Skill Percentage Distribution
The revealed comparative advantage index (RCA) confirms that China’s trade is climbing up the skill ladder in figure 7. The RCA trend of low-skill and medium skill blue-collar is declining while RCA trend of high-skill and medium skill white collar in rising. China had its comparative advantage in low-skill and medium skill blue-collar goods in 1999. It became less competitive in these labor skill goods. In 2008 China lost its comparative advantage of trading low-skill goods to the U.S. On the other hand, China has gained comparative advantage in trading high-skill goods in the last decade. According to figure 7, the RCA value of high-skill goods increased from -0.4 in 1999 to 0.7 in 2011 becoming the sector that China has the most comparative advantage with U.S. China has also suffered loss in its comparative disadvantage in medium skill white-collar goods from -0.7 in 1999 to 0.35 in 2011.
4.2 China - EU Bilateral Trade

China-EU trade has increased dramatically in recent years. China is the EU’s biggest source of imports and is becoming the EU’s fast growing export market. Since the new EU Member states have income levels below the EU average, it makes sense to group them separately in order to compare and contrast trade patterns. The old EU Member States (EU-15) are Austria, Belgium, Germany, Denmark, Finland, France, United kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden. The new EU Member States (EU-NMS) are Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia.

China – EU-15 exports has increased from 2.8 percent of China GDP in 1999 to 6.3 percent in 2007 before the financial crisis while imports have increased by a much lower degree than exports in the same period according to figure 8. The large increase of exports is mainly due to the increase of high-skill goods exports as shown in figure 9, indicating that the value added of China’s exports is becoming greater. Low-skill exports have the highest share in the last decade thought its share is falling. It counted for about 40 to 30 percent of total exports to the EU-15. Export share of medium skill goods stayed stable between 1999 and 2011. On the other hand, over time China has been importing less medium skill white-collar goods in exchange for more medium skill blue-collar and
low skill goods, showing that China is importing goods with lower skill requirement from the EU-15 countries.

Figure 8. Exports-Imports of China-EU 15 Trade

Figure 9. China-EU15 Exports Labor Skill Percentage Distribution
Figure 11 shows China has its comparative advantage in low-skill goods though the comparative advantage became weaker with time. China had a comparative advantage of medium skill blue-collar goods in 1999 however goods became less attractive and ultimately lost its
comparative advantage in 2009. China has a disadvantage in high-skill and medium skill white-collar goods indicated by negative RCA indexes yet China is trying to increase its competitiveness in these advanced labor skill groups.

Figure 12. Exports-Imports of China-EU NMS Trade

Figure 13. China-EUNMS Exports Labor Skill Percentage Distribution
The exports and imports trade pattern of China – EU-NMS is similar to that of China – EU-15 according to figure 12. Both exports and imports have increased in the last decade. Exports to the
EU-NMS has increased much more than imports and experienced a greater shock from the financial crisis. The widening gap between exports and imports signifies China is increasing trade surplus with EU-NMS. Accordingly, China – EU-NMS bilateral comparative advantage in high-skill and medium skill white-collar are increasing while bilateral competitiveness in low-skill and medium skill blue-collar are decreasing. China has increased its exports in medium skill white-collar goods to about 50 percent of total exports to the EU-NMS in 2010. However, export share of low-skill goods has dropped tremendously from 67 percent of total exports to EU-NMS in 1999 to 22 percent of total EU-NMS exports in 2011. China gained strong comparative advantage in trading high-skill and medium skill white-collar goods and remained its comparative advantage in trading low-skill goods. The highly negative RCA-value of medium skill blue-collar in 2011 indicate China comparative disadvantage in such industries.

![Figure 16. Exports-Imports of China-India Trade](image)

**4.3 China – India Bilateral Trade**

China and India, two neighboring Asian emerging economies, have strengthened their trade relationships even further in the last decade. From 1999 to 2005, exports and imports increased at the same pace from 0.1 percentage of China GDP to just above 0.4 percentage of China GDP.
according to figure 16. After 2005, exports to India kept increasing and remained steady at 0.7 percentage of China GDP after 2007, nevertheless imports from India remained steady and decreased after 2007. This creates an increasing trade surplus for China-India bilateral trade according to figure 16. 50 percent of China's exports to India are medium skill white-collar labor goods in 2011. The share of low-skill exports is decreasing sharply from 45 percent in 1999 to 21 percent in 2009. Instead China's exports share of medium skill white-collar and high skill goods are increasing. Roughly 80 percent of China-India imports are low-skill goods from 1999 to 2011 meaning China mostly imports low-skill goods from India. The other 20 percent of China-India imports mainly go to medium skill white-collar goods though the amount is decreasing after 2002, reflecting an increasing share of low-skill imports according to figure 18. While the other two groups accounted for less than 5 percent of total China-India imports. The RCA-values in figure 19 showed China has strong comparative advantage in all skill groups expect low-skill group. High-skill goods have an RCA-value of 2.3 in 2011. Having obtained comparative advantages in medium skill and high skill goods in 1999, China has strengthened its competitiveness in these industries.
Figure 18. China-India Imports Labor Skill Percentage Distribution

Figure 19. China-India RCA
In bilateral trade, China has increased its competitiveness in high skill goods by gaining a comparative trade advantage in the U.S., EU New Member States and India. Along with high skill goods, RCA-values of medium skill white-collar goods are increasing among the four major trading partners. China has a bilateral comparative advantage in medium skill white-collar goods with EU New Member States and India in 2011 though it is disadvantaged with the U.S. and E.U 15 countries. On the other hand, China’s competitiveness of low-skill goods has dropped versus all trading partners. China’s world competitiveness for medium skill blue-collar is positive and stable while its pattern to individual country or country group differs. It has increased its competitiveness in India while losing its competitiveness in EU 15 countries and the U.S. The structural change of China’s bilateral trade pattern with its major trade partners is affected by China’s shift towards products needing more advanced skills. With relatively low labor costs, China still has a comparative advantage in low-skill products. At the same time, bilateral trade of high-skill products has been increasing steadily and has become even more competitive than production of low-skill goods in 2006. With more high-skill exports, the value added is much greater and this has contributed to China’s large trade surplus.
5. Econometrics Results

Now we will look at the econometric determinants of China’s trade balance using the reduced form equation of exports and imports. The way it has been used in previous literature has been discussed in section 2, and we will follow Cline’s (2010) methodology and use it as our first specification. Our second specification has an additional variable to test the effect from the financial crisis.

The data used is taken from the International Monetary Fund World Economic Outlook database and UN Comtrade database. Annual data from 1999 to 2011 is analyzed through the equations with various specifications. Results are reported in table 1.

We tried varies lagged structures and find that a specification with two years lag is not significant. However, when we induce it simultaneous with one-year lagged real effective exchange rate in the regression, we find one year lagged is most significant in all estimations. Therefore, we decided to represent results with one-year lagged REER shown in table 1.

Figure 20 shows the trend of China’s trade balance with all trading partners, as a percentage of GDP, against the lagged real effective exchange rate of RMB between 1999 and 2011. The lagged rate is a one period lag for real effective exchange rate. The figure suggests that China’s trade balance has a negative correlation with lagged real effective exchange rate. As RMB depreciated from 113 index point to 100 index point during 2002-2006, China's total trade surplus widened 6 percentage points during the same period. Similarly when the RMB appreciated dramatically after 2006, China's total trade surplus declined substantially. The pattern is strongly suggestive of a fairly close relationship between China's trade surplus and the real exchange rate of RMB. It shows that they are inversely correlated.
A regression confirms the presence of a statistically significant relationship for the real exchange rate. As shown in Table 1, estimation 1A gives us the result of China’s trade balance vis-à-vis all trading partners.

Result suggest that the lagged real effective exchange rate is significant and carries an expected negative sign, suggesting that an appreciation of RMB has a significant and negative impact on China’s trade surplus. The coefficient of China’s lagged real effective exchange rate indicates that a 10 percent increase in the real effective appreciation of RMB is found to cause a reduction in China’s total trade balance by 2.46 percent of China’s GDP, or $180 billion at 2011 levels. The time trend is significant and positive, showing that ceteris paribus, China’s total trade surplus is widening overtime. The growth difference between China and the world is not significant. In estimation 1B, the regression shows the financial crisis doesn’t have an independent significant effect on China’s total trade balance. Despite difference in sample period and data frequency, our finding of exchange
rate being significant is in-line with the findings of Wang and Wan (2008) and Herrero and Koivu (2007).

Having seen the developments in China’s overall trade balance, let’s examine an individual country’s bilateral trade with China. Figure 21 shows China’s bilateral trade vis-à-vis all trading partners (EU-15, EU-NMS, USA and India) as a percentage of China GDP between 1999 and 2011. Each country has a different trade pattern with China. While the United States is in a huge deficit with China’s trade, Japan is running a surplus with China’s trade. Since each bilateral relationship is different than another, the role of exchange rate, growth difference between countries, time trend and the financial crisis period differs in magnitude and sign. In the following paragraphs, I will explain estimation results for China’s trade surplus with EU-15, EU-NMS, USA and India.

Figure 21 China’s bilateral trade balance vis-à-vis all trading partners, USA, EU-15, EU-NMS and India as percent of China GDP
5.1 China - EU-15 Bilateral Trade

The results in estimation 2A suggest that a one-year lagged real effective exchange rate has a significant and negative impact on China’s trade balance with EU-15. The coefficient of China’s lagged real effective exchange rate indicates that a 10 percent increase real effective appreciation of RMB is found to cause deterioration in China’s bilateral trade surplus (i.e., a reduction in the trade surplus) with EU-15 by 0.51 percent of China’s GDP, or $37 billion at 2011 levels. Growth difference and time trend are not significant in estimation 2A. However, when we add the dummy variable for the financial crisis in estimation 2B, both time trend and financial crisis dummy variable become significant at the 1 percent level. Extracting the impact of financial crisis on bilateral trade balance, the estimated coefficient shows that every other year the bilateral trade balance increases by 0.23 percent of China’s GDP which is equivalent to $16.8 billion, while the financial crisis reduces the bilateral trade balance by 1.49 percent of China’s GDP, or $108.7 billion. This supports Moosa’s (2012) view on the negative effect of the Great Recession on imports following the global financial crisis. As demand from EU-15 declines, the level of imports from China to the EU-15 is reduced and leads to a reduction in the bilateral trade balance. To summarize, real effective exchange rate has an impact on China’s bilateral trade balance with the EU-15. The positive impact from time trend matches the rising trade balance from 2001 to 2007 in figure 2. The decreasing trend from 2007 to 2009 reflects the negative impact of the financial crisis.

5.2 China - EU-NMS Bilateral Trade

Let us examine the trade balance between China and EU new Member States. From estimation 3A, lagged real effective exchange rate is significant and negative while growth difference and time trend are not significant. The coefficient of China’s lagged real exchange rate indicates that a 10 percent real effective appreciation of the RMB reduces trade balance by 0.06 percent, or $4.7 billion. The magnitude of the coefficient is much smaller compared to China’s trade balance with EU-15 since the trade balance is much greater for EU-15 than EU new Member states. Most new member states are developing countries while EU-15 includes the most developed countries. The coefficient of the financial crisis variable is significant when we include it in
estimation 3B indicating that bilateral trade balance decreases by 2.5 percent of China’s GDP, or $182 billion, due to the recession of financial crisis. This again confirms Moosa’s (2012) argument on the financial crisis. The magnitude of this coefficient tells us that the financial crisis has a bigger negative impact on the new Member States than the negative impact on EU-15, while the effect of China’s real exchange rate is less for new Member States than for EU-15.

5.3 China – USA Bilateral Trade

China’s real exchange rate has a negative and significant impact on the bilateral trade between China and the United States in estimation 4A indicating that a 10 percent real effective appreciation of the RMB reduces trade balance by 1.3 percent, or $95.5 billion. Our estimation of the coefficient of China’s real effective exchange rate is much greater than Cline’s estimation. The same statement holds when we estimate trade balance with an average real effective exchange rate from the previous two periods, which is the same specification that Cline used. Despite the fact that our methodologies are the same, the sample period from 1999-2011, which was used in this estimation, is more comprehensive than the period from 1999-2009, which Cline used in his estimation. In addition, we are estimating from China’s perspective while Cline is estimating from the Untied State’s perspective indicating that there might be data discrepancy. Unlike Cline’s estimation, the coefficient of growth difference in estimation 4A is not significant. However, it carries the expected negative sign suggesting that China’s growth is export led. The time trend is significant. The coefficient shows that China’s trade balance with the United States widens every year. In estimation 4B, while all other variables stay the same, the coefficient for years of financial crisis is not significant. Our result does not support Moosa’s (2012) criticism on Cline’s misinterpretation of China and the United States bilateral trade. Moosa (2012) suggests China-USA trade balance is influenced by the Great Recession from the financial crisis, other than exchange rate. On the other hand, our results show that financial crisis would slow down China’s import to the United States and improve trade balance.
5.4 China – India Bilateral Trade

In the case for India, China’s real exchange rate, growth difference and financial crisis are not significant in any specification while time trend is indeed significant. The current period real effective exchange rate has a greater impact than one-year lagged real exchange rate or two-year lagged real exchange rate even though it is insignificant. Another observation from our estimation is that people seem to adjust their business with the real exchange rate in current year, because the coefficient of current period real exchange rate do not change when we estimate trade balance with both current period and one-year lagged real exchange rate from when we estimate trade balance with just current period real exchange rate. China’s trade balance with India is due to policy changes from both India and China. They undertook a large amount of liberalization from the 1990s and onwards. India slowly reduced its tariffs and in 2005 custom duty fell to 4.9 percent. As a part of the liberalization on trade regime China agreed to eliminate all import quotas, licensing requirements and other non-tariff barriers and agreed to lower the average industrial tariff to 9 percent and average agricultural tariff to 15 percent by 2005. This explains the surge of China – India trade balance between 2005 and 2006 as well as empirically proven by a positive and significant tariff variable in estimation 5C. The positive coefficient shows China has gained more market share in trade balance than India after the liberalization.

5.5 Cross country comparison

Comparing China’s trade relationships with EU-15 countries, EU new Member States, USA, India and Japan, we find China’s real exchange rate has an impact on the trade balance with EU-15, EU-NMS and the United States while it affects the trade balance with India. The magnitude of lagged REER is greater for the United States than for EU-15 counties all together. This shows fluctuation of China’s real exchange rate has more impact on trade with the United States than on trade with Europe. The coefficient of lagged REER for EU new Member States is much less than that for EU 15 countries.

The coefficient for growth difference is not significant for any countries or country group. However, the positive coefficients for most countries’ estimations excluding EU-NMS and USA
indicate that China’s growth is export led. According to income effect, if China is growing at a faster rate than EU 15 countries, consumption should be higher which leads to greater imports and may lead to a narrowing of the trade balance. Our results did not prove the income effect and one explanation is growth of China is dependent on imports to foreign countries. If we estimate growth of China and growth of foreign country separately, we are likely to find the coefficient of growth of foreign country to be significant while the effect of foreign growth rate on China’s trade balance rate is offset by the effect of China’s growth rate in this specification. With the limitation of our sample size, we do not have enough observations to test it empirically.

The Great Financial Crisis has an impact on China’s trade relationship with EU-15 and EU-NMS and the effect is much greater for EU-15 than for EU-NMS. The time trend is significant for all estimations, which is coherent with analysis of China’s trade structural change. China is expanding its market share in all trading partners by changing its trade structure from low-skill products to more high-skill products.

**Results with Skill Intensity Variable**

In order to verify my theory stated above, I will add two more specifications which include the RCA-value of high skill products and percentage distribution of high skill exports:

\[
TB = f(\text{REER, GDI}, \text{RCA}_{HighSkill})
\]

\[
TB = f(\text{REER, GDI, Percentage Distribution}_{HighSkill})
\]

The results are shown in table 2. When we replace the time trend variable with RCA value of high skill products the results are similar. RCA-values of high skill products are significant for China-World, China-U.S. and China-India bilateral trade balances, indicating China’s competiveness in high-skill products has a positive relationship with China’s trade surplus. A one-unit increase of RCA value will improve China’s total trade balance by 3.87 percent, or $282 billion; it will improve China’s trade balance with the U.S. by 2.24 percent, or $163 billion. The coefficient of China-India RCA value is significant with a 0.38 coefficient for RCA value. The coefficient of RCA value is not significant for the EU-15 countries while it carries the wrong sign for the EU-NMS. The coefficient of RCA for EU-15 and EU-NMS are the results we expect since the time trend variable was not significant in the previous set of results unless it is put together with the financial crisis variable for
the European Union. It indicates that the financial crisis period heavily affected the China-EU trade balance and overweighs the effect of China’s structural change in trade composition.

The coefficients of high skill export percentage distribution give us similar results shown in table 2. The coefficient of high skill export percentage distribution is significant for China-U.S. and China-India trade relationship. A 10 percent increase of China's high skill exports to the U.S. increase bilateral trade balance by 1.64 percent, or $119 billion. A 10 percent increase of China’s high skill exports to India increase bilateral trade balance by 0.38 percent, or $27.7 billion. Again, it is not statistically meaningful for China-EU trade relationship and not significant for China total trade balance. My results have empirically proven the proposed theory in China's trade relationship with all trading partners, the U.S. and India while it is not the case with the EU.
6. Conclusion

The dynamics of China’s trade in the last decade shows some interesting and relevant characteristics. First, China is increasing its competitiveness in high skill production and losing its competitiveness in low skill goods. China is shifting up the skill level of production traded and is increasingly integrated into the worldwide value added chain. This has led to a change in China’s comparative advantages and an increase in China’s trade surplus with the rest of the world especially its major trading partners.

Secondly, our econometric results provide empirical support for arguments that deem that China’s real exchange rate plays a significant negative role in China’s trade balance with the rest of the world, the U.S. and the EU. An appreciation of exchange rate is considered to improve trade balance, which agrees with Cline’s (2010) argument. Cline (2010) and US analysts have criticized the Chinese for manipulating the exchange rate to maintain its large trade surplus. However, they fail to acknowledge the fact that China’s goods are rising up the skill ladder. China’s large and increasing trade balance is more due to structural change than exchange rate. Therefore, we argue that China is not manipulating the exchange rate but rather the traded goods in China is contributing more to the value added chain and in higher demand.

Finally, the highly positive time trend for China’s trade surplus with its major trading partners suggests that China is expanding its market share in all trading partners by changing its trade structure. Our other econometrics tests empirically supported my first argument. As China strengthens its competitiveness in high skill productions, China’s total trade surplus will increase, as will the trade balance for China-U.S. and China-India trade.