How China contributes to a lower import price index for the United States

A statistical overview of the influence of the trade between the United States and China on the import price index of the United States.

Bachelor Thesis 2013

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Abstract

The United States are running high deficits for years but now it comes to a whole new level when the debt/GDP ratio cross the 100% border. United States is blaming the Chinese for their high trade deficit because the imports from China are almost 4 times as high as the exports to China which lead to more than 2.5 trillion dollars in bilateral debt over the last 10 years. That is why the United States is pushing China to let their currency appreciate which will lead to a more balanced trade. But is that a good idea because the trade with China also have positive points otherwise there would be no trade.

This research will show that sectors where China has a great part of the total import the inflation rate is significantly lower than sectors where China only has a small share of the total import of the United States. However this paper will also show that there is not a strong relationship between the growth of the share of Chinese products in a sector and a decrease in the inflation rate.

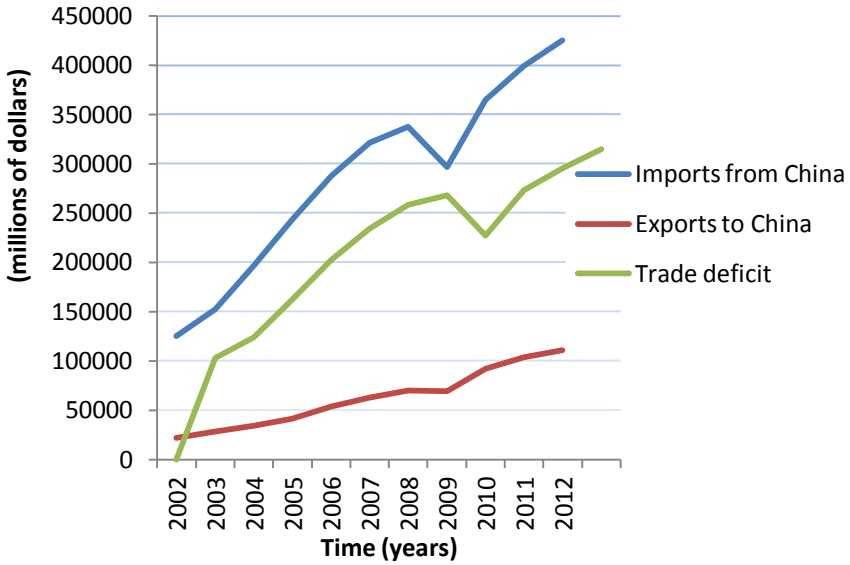
So what the effect is of the share of imports from China for the United States is still unclear but it tends to have some sort of effect on the inflation level.

Introduction

The United States of America and the rest of the world are facing a great global crisis since 2009. Instead of a crisis where financial institutions and companies having a hard time to keep their head above water, this time even countries are not safe anymore. More and more countries like Spain, Greece and Cyprus are knocking at the door of the IMF or the ECB to ask for cheap loans so they can pay their short term debt. Furthermore a lot of countries are down rated by credit rating agencies such as Moodies and Standard & Poor). Even the greatest economy of the world, the United States, is having a hard time and suffered a down rating during the crisis. In 2011 and 2013 the United States reached the debt ceiling which would automatically leads to dramatically cuts in education and healthcare. To prevent this actions, president Obama higher the debt ceiling twice.[1] At the end of 2012 the national debt of the United States was 101.6% of his total GDP.
The question that arose among economists and politicians is why the debt is so high and who is to blame.

More and more people are pointing at the Chinese. Chinese import to the United States has grown rapidly in the last decade from 125 billion dollars in 2002 till 425 billion dollars in 2012. The export however has only grown from 22 billion dollar to approximately 110 billion dollar. Which follows is a massive bilateral trade deficit of almost 2.5 trillion dollars over the last 10 years. (See figure 1)

Figure 1; US Imports, Exports and trade deficit with China



[1] http://www.guardian.co.uk/news/datablog/2011/jul/15/us-debt-ceiling-historic

How is it possible that the US runs a deficit that high with a country? The answer lies within the exchange rate policy of China, namely a fixed exchange rate pegged to the US dollar. In a normal circumstance this would not be a problem if the exchange rate is pegged around his natural level (when it is freely floated). Unfortunately this is not the case with the Chinese Renminbi. According to several researches like Vox[2] the Renminbi is highly undervalued which means its valued lower then it would be with a freely floated exchange rate. The undervaluation differs from 20 till even 50%. For Chinese exporters this is a competitive advantage because their exports are very cheap for other nations. However imports are more expensive for China which lowers the total of imports of China.

This problem is even mentioned by president Barrack Obama during a news conference of the White House in 2011. He stated that it's now time to move towards a market-based system for the Chinese currency, because right now the exports to China are too expensive and the imports too cheap. This throws the entire world economy of balance because they are not buying as much as they could from other countries.[3]

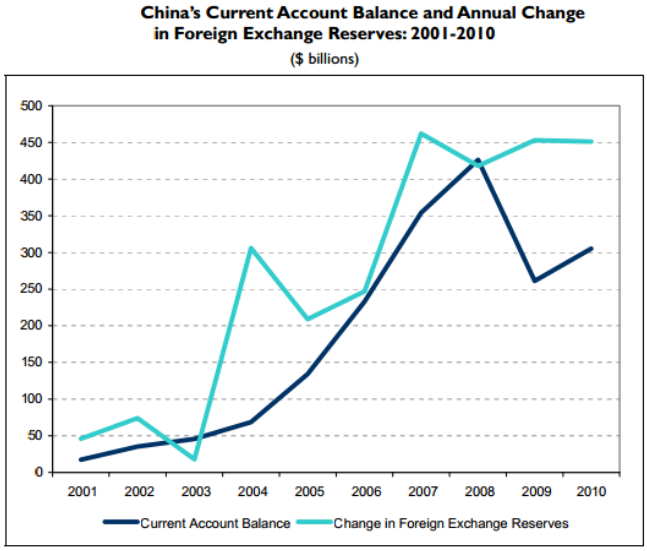
More specific the U.S. claims that the undervaluation of the Renminbi has a significant large effect on the unemployment in the United States. According to a paper by Robert E. Scott the total jobs lost through imports minus the jobs gained through exports due to trade with China is approximately 2.790.100 jobs displaced. The Manufacturing sector is the sector where the jobs displacement is the highest. Around 69.2% of the total jobs displacement comes from the Manufacturing sector because they cannot compete with the low priced manufactured goods from China.[4]

Furthermore there is a second problem that causes American politicians headaches and that is the very high number of US Government securities owned by the Chinese.
The reason behind this is as follows: China exports more to the United States then the United States exports to China. This will put pressure on the Renminbi to appreciate against the dollar because markets always clear and without intervention the currency market will change the Renminbi/dollar exchange rate until the value of import and export is equal to each other. To maintain the fixed exchange rate, the Central bank of China intervenes in the money market to buy US currency with Chinese Renminbi approximately equal to the trade deficit. By doing so they keep the demand for dollars high and supplies the excess demand of the Renminbi. But now the Chinese have a sack of dollars which increase the total money stock (**Money stock= Foreign Currency + Domestic Currency)**[5]. This will only lead to inflation in China, so they sterilize these dollars by buying U.S.

[2] http://www.voxeu.org/sites/default/files/currency_dispute.pdf#page=71 page 64
[3] http://www.whitehouse.gov/the-press-office/2011/11/14/news-conference-president-obama
[4] http://www.epi.org/files/2011/BriefingPaper323.pdf page 11 table 3
[5] Exchange rates and International Finance Laurence Copeland page 128.

treasury notes and securities which are known as the one of the most save investment. By doing so over the past few years China has become the largest foreign holder of U.S. Securities.
In figure 2 you can see that China's current account balance almost equals the annual change in Foreign Exchange reserves. So every dollar that China earns on trade they lend back to the United States. The concern about this is that due to the large holdings of China in U.S. securities it may give China leverage over the United States economy. China can for example reduce its holdings of U.S. securities which will lead to a collapse of the dollar with all the consequences of it. [6]

Figure 2[7]



Source: Economist Intelligence Unit, IMF, and Chinese State Administration of Foreign Exchange.

However the Chinese claim on their Embassy website in the United States that the trade between the United States and China is a Win-Win Situation[8]. At first they are claiming that China has been helping the United States to conquer the crisis. Not only is China the United States' third biggest market for exports[9]. During the start of the crisis in 2009 the total exports of the United States declined by almost 18% while the exports to China hardly decreased (only 0.33%).
Second they stated that because of the import of labour intensive goods from China the consumer price index is much lower than it would be without these goods. Without these goods the consumer price index would be 2% higher per year. If that is true it would significantly contribute to a higher purchasing power for the U.S. consumers. This effect is not limited to consumption goods but also firms contribute to an undervalued Renminbi. Producers who imports inputs for their production

[6] http://www.fas.org/sgp/crs/row/RL34314.pdf page 16
[7] http://www.fas.org/sgp/crs/row/RS21625.pdf
[8] http://www.china-embassy.org/eng/xw/t675646.htm
[9] https://www.uschina.org/public/exports/2003_2012/2012-us-exports-top-10-markets.pdf

process from China become more competitive because these inputs are lower priced than inputs from other nations.

And finally where some people see the acquisition of U.S. securities by China as a threat, some others think that this is also a very good thing because it kept the interest rates low. When China stops with keeping the Renminbi undervalued there is no need for them to buy US securities or at least not in current proportion. However it is unlikely that in the short term the United States close the trade deficit so they now need to find other investors to fill the liquidity gap. This will automatically lead to a higher interest rate (less supply because China dropped out). This higher interest rate leads to a lower investment rate which damages the economic growth.

Research

As stated in the introduction there is a lot of discussion about the bilateral trade between China and the United States. The aim of this paper is not to look at the negative points of the high bilateral trade deficit of China with the US due to the undervaluation of the Renminbi. This paper will search for positive effect. In particular the effect this trade has on the inflation level in the United States.

In this paper I will explore if there is in a sector a lower inflation rate (index) when China has a larger part of the total import of a certain sector by answering the following research question.

Does the trade with China has a lowering effect on the inflation rate on imported goods

Null hypothesis: The size of the share of China in a sectors total import by the United States has no influence on the inflation level in the same import sector.

Alternative: The size of the share of China in a sectors total import by the United States has a lowering effect inflation level in the same import sector.

At first this paper will start with explaining the theoretical framework and the methodology and techniques that will be used. Following up by a short explanation about the data that is going to be used for this research. After that I will analyse the results and explore the limitations and interpretation of this research. I will finish with my conclusion where I will answer the research question.

Methodology

Theoretical framework:

In this paper I will investigate if there is a relationship between imported goods from China per sector and the imported price index in the United States. In order to achieve this research I will divide this question in three parts.

I will start my research by exploring some data. At first I want to research if there is a significant effect of the imported price index on the consumer price index and second I want to be able to investigate if there is overall a lower inflation rate on goods from China then from other nations.

Second, for all sectors I will calculate how great China's part is in this sector and after that I will divide the sectors in two groups in two different manners.
The first group allocation will be on base of the average import of Chinese goods by the United States over the past 4 years. The two groups will consist of sectors with a lower participation of China's export to the United States and sectors where China exports more than the average.
The second group allocation will be on base of the median sector in 2012. The two groups will consist of sectors above and under the median, which will lead to an equal group size.

Third, I will use statistical research to see if there is a significant difference in inflation rate in the two groups for both the ways. The statistical program I will use is SPSS. This program is suitable for comparing two groups.

Fourth, I will do the same research but then for the period 2003-2006 to see if there is any difference over time.

Fifth, I will make 3 regressions in eviews.

- The inflation level of the sectors as dependent variable, regressed with the share of Chinese goods in the total import per sector by the United States
- The inflation level of the sectors as dependent variable, regressed with the percentage change in the share of Chinese goods in the total import per sector by the United States
- The percentage change of the inflation level of the sectors as dependent variable, regressed with the percentage change in the share of Chinese goods in the total import per sector by the United States

To complete this research I want try to calculate effect on the consumer price index. So here I will explore how great the influence of imported inflation is on the total consumer price index of the United States and if China contributes to a significant lower consumer price index. This last point came up my mind when reading on the Chinese embassy website that because of the cheap RMB the CPI of the United States is 2% point per year lower.

Data

Most of the data is collected from the U.S Bureau of Census, the leading source of quality data about the nation's people and economy[10]. The index numbers are collected from the bureau of labor statistics. This is the principal Federal agency responsible for measuring labor market activity, working conditions and price changes in the Economy[11]. The subject area for price changes in imports is called the International Price Program (IPP) and produces **Import/Export Price Indexes (MXP)** containing data on changes in the prices of non-military goods and services traded between the U.S. and the rest of the world.[12]

In my research I will compare goods from different sectors which the US is importing from other nations. There are in total 142 sectors. Unfortunately there are not for all the sectors price indices available, this eliminates 47 sectors. However the relative importance for these 47 sectors is in total only 5% of the total goods traded. So there is only data missing from the smaller sectors.

The price indices that I will use have different base years with 2003 as most common. Also it is monthly data where the rest of the data is in years. That is why I change the monthly data to average import price index number over the last year. Furthermore is it impossible to compare different groups when all the sectors have different base year. That is why I change the import price indices to yearly inflation rates by using the following formula:

Inflation year T = (price index year T – price index year T-1)/price index year T-1)*100%.

Input	Description	Sources
Year	1985-2013 (otherwise noted)	
Total import US from China	Millions of dollars (monthly data)	Bureau of Census
Total export US to China	Millions of dollar (monthly data)	Bureau of Census
US total goods traded with all nations	Billions of US dollars year different per country (monthly data)	Bureau of Census

[10] http://www.census.gov/aboutus/
[11] http://www.bls.gov/bls/infohome.htm
[12] http://www.bls.gov/mxp/home.htm

Import US from the World per sector[13]	In dollars 2003-2012 (yearly data)	Bureau of census
Import US from China per sector	In dollars 2003-2012 (yearly data)	Bureau of census
Export US to the World per sector[14]	In dollars 2003-2012 (yearly data)	Bureau of census
Export US to China per sector	In dollars 2003-2012 (yearly data)	Bureau of census
Import with all nations per sector	In dollars 2003-2012 (yearly data)	Bureau of census
Export US with all nations	In dollars 2003-2012 (yearly data)	Bureau of census
US import price indices for all sectors	Index numbers 2000=100, unless otherwise noted, number of years differs per sector (monthly data)	Bureau of labor statistics
Consumer price index	Index numbers (monthly data). Index numbers 1982-1984= 100	Bureau of labor statistics

Techniques

SPSS

to compare two groups and there means I am going to use SPSS as statistical program.

At first I will use the option descriptive statistics to get more information about the groups mean, minimum, maximum and standard deviation. After analyzing the descriptive statistics I will use the Independent Samples Test T-test for equality of means. This test will compare two means and give answer if the two means differs significant from each other. When the significance level is lower than 5% there is a difference in mean.

Eviews

For each test in eviews I will provide several statistic figures. Since the aim is to find relations between inputs, I will use the method of ordinary least squares (OLS). OLS is a statistical way to obtain the value of influence of predictor variables (independent) on a certain dependent variable

All inputs are regarded as significant if the probability of rejection of the null hypothesis is below the value of 5 percent.

[13] Sectors import differ from sectors exports (end-use code import does not correspond end-use code export but some products can both be imported as exported)

To test data with ordinary least squares there are certain assumption that the data has to commit to. Otherwise the result is not reliable because it could results in several errors such as underestimation or overestimation of the significance and the Type 1 & Type 2 errors.
Type 1 error is the error that you reject H0 when in fact Ho is true and a type 2 error is the error that we accept H0 when in fact it should have been rejected[15]

The first assumption the OLS have to commit to is that variables are normally distributed. Non-normal datasets can lead to misleading relations and significance. To test for normality in the data the Jarque-Bera test will be used with a significance level of 5%. The null hypothesis of this test is that the data has a normal distribution so H0 should not be rejected.

The second assumption is that there is homoskedasticity in the variance of the residuals. This means that the variance in the residuals do not differ from each other. The test that I conduct is the Breusch-Pagan test. The null hypothesis of this test is that the variance in the residuals is homoskedastic. If the null hypothesis of no heteroskedasticity of the residuals (homoskedasticity) is not rejected the residual terms of the regression are not biased and thus trustworthy.

The third assumption is that there is no serial correlation in the residuals. This means that the residuals are not cross correlated to each other. To test for this assumption I will use the Durbin-Watson test. The value of this statistic should be 2, but this is very hard to accomplish. Therefore I will set the border on 1,5 and 2,5. If the value of the Durbin-Watson test is between these numbers there is only a small portion of serial correlation.

Furthermore I will give a graphical picture of the serial correlation by conducting a Correlogram. This is a tool which shows where the serial correlation comes from, so in which year/lag. In the Correlogram no single lag (represented by a balk) may exceed the lines. The lines stand for the critical value on a significance level of 0.05. Besides giving a graphical view of the serial correlation the Correlogram further give the same result as the Durbin-Watson test.

[15] The practise of Business Statistics second editon , Moore, McCbabe, Duckworth and Alwan Page 408

Results

Regression 1

Dependent Variable: DLOG(INDEX_CONS__1982_100_)
Method: Least Squares
Date: 07/16/13 Time: 18:43
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.025076	0.002085	12.02728	0.0000
DLOG(INDEX_IMP_1982_100)	0.137590	0.039812	3.456022	0.0018

R-squared	0.299020	Mean dependent var	0.027705
Adjusted R-squared	0.273985	S.D. dependent var	0.012479
S.E. of regression	0.010633	Akaike info criterion	-6.185353
Sum squared resid	0.003166	Schwarz criterion	-6.091940
Log likelihood	94.78030	Hannan-Quinn criter.	-6.155469
F-statistic	11.94409	Durbin-Watson stat	1.049295
Prob(F-statistic)	0.001767		

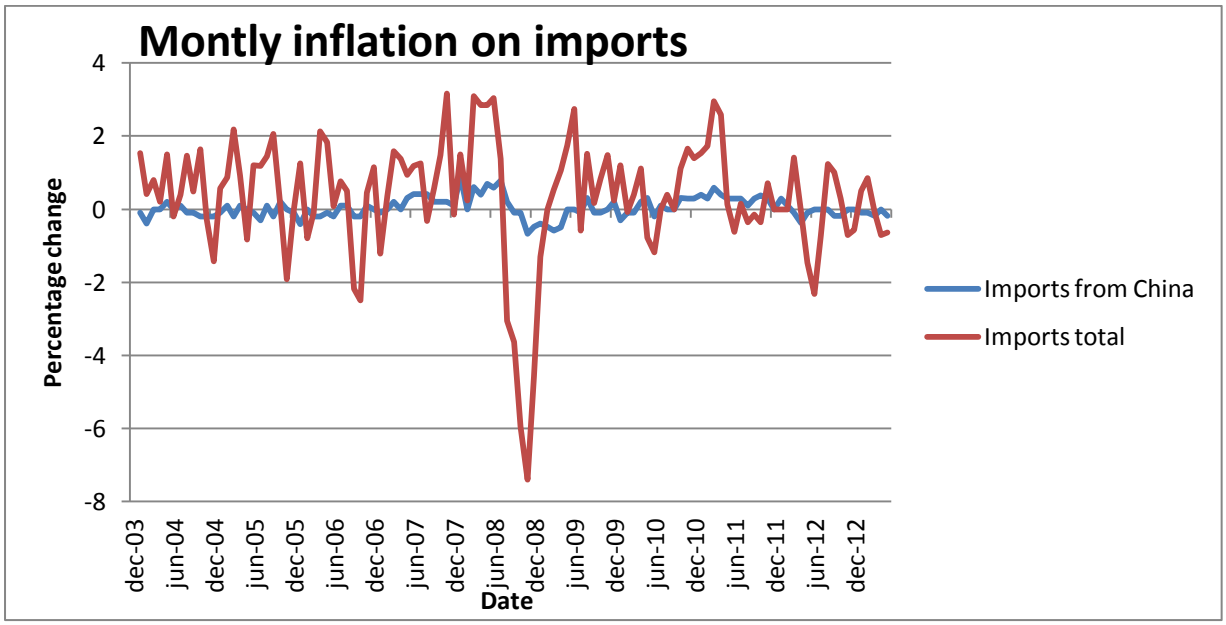
In the table above I regressed the consumer price index in the United States against the import price index to see what the effect of imported inflation is on the total inflation. In above regression both of the variables are modified by a dlog. There are a couple of arguments for the use of dlogs. In countries as the USA there is always a small level of inflation so the index will continue to rise which leads to a time trend. By using dlogs this time trend is removed from the series. Second dlog is of great help when trying to search for a relation between two variables, because when using dlogs it shows the elasticity between two variables.

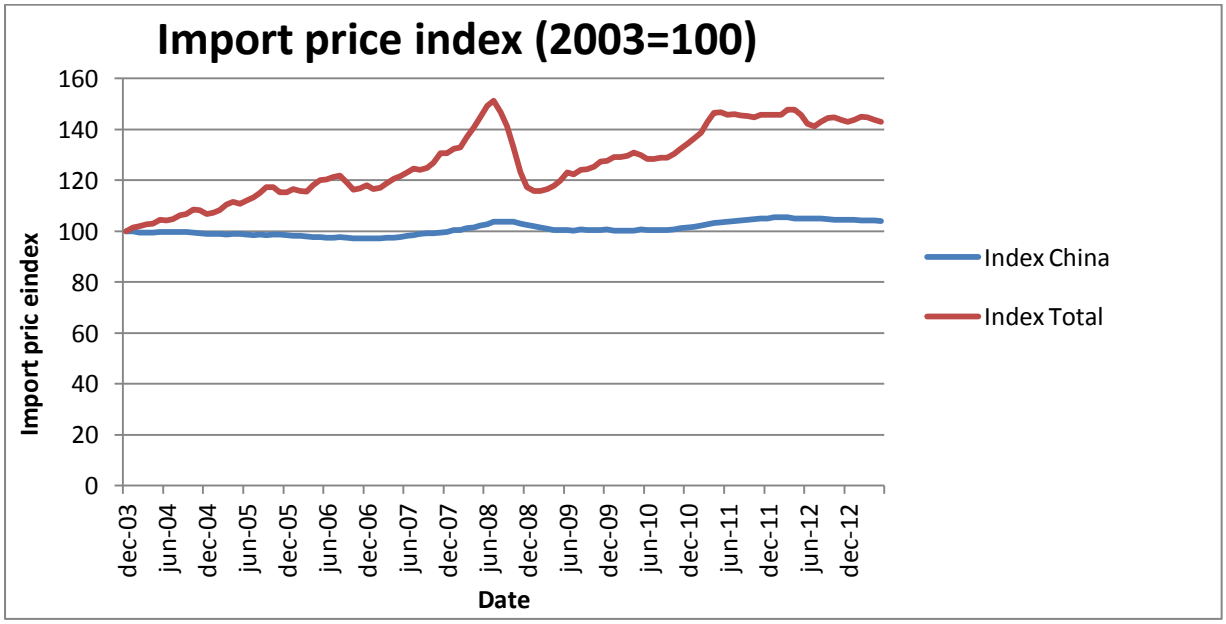
At first can be seen from the regression that the price index on imported goods has a significant effect on the consumer price index. The t-statistic is 3.456022 with a probability level of 0.0018 which implies that the null hypothesis of no effect must be rejected. The relationship between these two variables is that the price index on imported goods has a positive effect on the consumer price index with a coefficient of 0.137590. This implies that when the import price index grows with 1 percent the consumer price index rises with 0.137590 percent. This is not a very high effect but a plausible effect because the imports are just a part of the total consumer price index. The average import in percentage of GDP is 13,03% which is close to the outcome in the regression. The t-statistic is also significant with a significance level of 1%. A very negative point of the outcome is the Durbin-Watson statistic which only is 1.049295. This means that there is some significant autocorrelation in the regression. A good reason for this could be the R-statistic which in only 0.299020. So the error level is very high, more than 70%. Also when looking at the Correlogram we see that there is in the first lag period there is some autocorrelation with a significance level of 1% but not with a

significance level of 5%.

Next I will test this regression on normality. The value of the Jarque-Bera test on normality is 0.312451 with a probability of 0.855366 which means that the null hypothesis of normality cannot be rejected. The final test is on heteroskedasticity using the Breusch-Pagan-Godfrey test. The F-statistic of this test is 0,540523 with a probability of 0,4683 which means that the null hypothesis of homoskedasticity cannot be rejected. (See appendix 2.1 for the eviews tables)

Graph 1 & 2





Above graphs give some more information about the data I will use and shows some important contents.

At first graph 1; this is the import price index for all goods from the world compared to the import price index of all goods from china with 2003 as base year. Right at the beginning of the base year the total import price index grows far more rapidly than the import price index with goods from China. While the total goods price increased by 40% in the last 10 years, the prices of goods from China have not hardly increased in the last 10 years. But it is important no notify that this does not immediately imply that products from China have an overall lower inflation rate. It could be that China only export goods to the United States that in general have a lower inflation rate and that is does not export goods with a high inflation rate (such as oil).
When looking at graph 2 there are also some imported things that I will use in my research. The most important result is that the volatility of the inflation in total imports is much higher than the volatility of the inflation in imports from China. This is something I have to take care of in my further research. Because of this high volatility it is not useful to look only at the last year when comparing inflation rates between different goods. Therefore I will take the inflation between 2009 and 2012 as mark point; this will eliminate some of the high volatility. The last result from above graphs that is worthy to look at is the year 2008. In this year there was at first a very steep rise following up by a great fall in the import price index. A possible explanation is the beginning of the debt crisis or the appreciation of the Chinese Renminbi.

As described in the Methodology I will divide the sectors in 2 groups;(i) those which have a Chinese import share larger than the median Chinese import share and (ii) those which have a Chinese import share smaller than the median Chinese import share. Then I'll look whether the first group has a larger or a smaller change in the import price index as the second.

Table 1: Share of China in the total imports of the United States.

Year	Import US-China	Import US-World (in millions of $)	Share China in total import
2003	152436,0969	1257121,251	12,13%
2004	196682,0339	1469705	13,38%
2005	243470,1048	1673454	14,55%
2006	287774,3526	1853938	15,52%
2007	321442,8669	1956961	16,43%
2008	337772,6278	2103640,711	16,06%
2009	296373,8835	1559624,813	19,00%
2010	364943,8542	1913160,074	19,08%
2011	399361,9221	2207823,92	18,09%
2012	425643,5891	2275149,96	18,71%

In the table above you can see the steep rise of Chinese share in total import to the United States from 12,13 in 2003 till 18,71 in 2012. However the share of China in total import seems to be stabilized in the last 4 years. To define the two groups I'm going to use two methods. At first I am going to take the average of the last 4 years which is approximately 18.72%. Then I will divide the two groups; one group with sectors where China has more than 18.72% of the total share as average of the past 4 years in a sector and one group with sectors under 18.72 of total share in a sector.
The second method is to calculate the median share of Chinese goods for all sectors in 2012 and divide the groups in above and under median. The median share is 0,115024.
After analysing the results I will do the same for the period 2003-2006 to see if there are any differences in the result. I take 2003-2006 because this is the same time frame as 2009-2012(4 years). Otherwise I can't compare the inflation number.

The average of the share of Chinese imports between 2003 and 2007 is 0,138949. Again I will divide the two groups with one group higher then 0,138949 of Chinese share in a sector and the other group under 0,138949 of Chinese share.
The median of the share of Chinese goods in 2007 is 0,091666.

Descriptive Statistics Data 2009-2012

Descriptive Statistics

Groups divided with average share between 2009-2012

	N	Minimum	Maximum	Mean	Std. Deviation
UnderAverage	58	-32,100	79,185	20,79316	26,364078
AboveAverage	31	-18,952	74,753	8,43884	15,564847
Valid N (listwise)	31				

Descriptive Statistics

Groups divided with the median of 2012

	N	Minimum	Maximum	Mean	Std. Deviation
UnderMedian	44	-32,100	79,185	23,18376	27,948744
AboveMedian	45	-18,952	74,753	9,94494	16,842988
Valid N (listwise)	44				

As can been seen in both Descriptive Statistics the Mean of the Above group is lower than the Under group in both the cases. Furthermore the Standard deviation of all the groups is very high which shows that there is a lot of variance between the different sectors. The difference between the minimum and maximum is at his biggest in the group under average and under median with a difference of 111,285%. This implies that the difference between the highest inflation and lowest inflation growth is more than 111%.

Furthermore the groups divided with average do have a differ size. The reason for that is that there are some sectors where China has a lot of share of the total imports which risen the average. Examples of such sectors are Toys, computers, radios and footwear. In these sectors China has a share of more then 70%.

Except giving the Mean and standard deviation this Descriptive statistics do not give any answers regarding significant differences in these groups.

Independent sample T-test 1 data 2009-2012

Group Statistics

Groups divided with average share between 2009-2012

	GroupA	N	Mean	Std. Deviation	Std. Error Mean
Average	1,00	58	20,79316	26,364078	3,461773
	2,00	31	8,43884	15,564847	2,795529

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Average	Equal variances assumed	10,851	,001	2,392	87	,019	12,354322	5,164936	2,088452	22,620193
	Equal variances not assumed			2,777	86,052	,007	12,354322	4,449590	3,508906	21,199739

At first the results of the groups divided on average between 2009-2012. Group 1 is the under average group with N=58 and group 2 is the above average group with N=31. As stated in the descriptive statistics the mean of the inflation between 2009 and 2012 is lower in the above average group. To research if this is a significant difference I use the Independent T-test for equality of Means. The table above consists of two parts and two different t-tests. One with equal variances assumed between the two groups and one with no equal variances between the groups. Levene's Test for Equlity of Variance decides which T-test I will need to use. The Null hypothesis of this test is Variance group 1 = Variance group 2 and the alternative hypothesis is Variance group 1 ≠ Variance Group 2. The F-statistic of this test is 10,851 with a level of significane of 0,001. This implies that the null hypothesis of equality of variance in the two groups can be rejected which implies that there is a difference in variance between the two groups so I have to look at the bottom line for the results.

The T-statistic of this test is 2,777 with a degrees of freedom of 86. The 2-tailed significance level is 0.007 which implies that the null hypothesis of equality of Means can be rejected with a significance level of 1%. So there is a difference between the means in the two groups divided by average.

Independent sample T-test 2 data 2009-2012

Group Statistics

Groups divided with the median of 2012

	GroupM	N	Mean	Std. Deviation	Std. Error Mean
Median	1,00	44	23,18376	27,948744	4,213432
	2,00	45	9,94494	16,842988	2,510804

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Median	Equal variances assumed	13,503	,000	2,714	87	,008	13,238825	4,878834	3,541615	22,936037
	Equal variances not assumed			2,699	70,298	,009	13,238825	4,904808	3,457223	23,020429

Second, the outcome of the groups divided on median share in 2012. Group 1 is the under median group with N=44 and group 2 is the above median group with N=45. As stated in the descriptive statistics the mean of the inflation is lower in the above median group. To research if this is a significant difference I use the Independent T-test for equality of Means.

Again I first have to do Levene's Test for Equality of Variance to decide which T-test I will need to use. The F-statistic of this test is 13.503 with a level of significance of 0.000. This implies that the null hypothesis of equality of variance in the two groups can also be rejected for this T-test which implies that there is a difference in variance between the two groups so again I have to look at the bottom line for the results. The T-statistic of this test is 2,699 with degrees of freedom of 70. The significance level is 0.009 which implies that the null hypothesis of equality of Means can be rejected with a significance level of 5%. So there is a difference between the means in the two groups divided by median.

Descriptive statistics data 2003-2006

Descriptive Statistics

Groups divided with average share between 2003-2006

	N	Minimum	Maximum	Mean	Std. Deviation
UnderAverage	50	-7,84491	129,62617	26,1548578	33,34300936
AboveAverage	24	-27,31340	49,38798	3,7110958	15,07285312
Valid N (listwise)	24				

Descriptive Statistics

Groups divided with the median of 2006

	N	Minimum	Maximum	Mean	Std. Deviation
UnderMedian	37	-7,84491	129,62617	29,1560055	37,58362314
AboveMedian	37	-27,31340	51,10394	8,5955943	15,98469037
Valid N (listwise)	37				

As well as the descriptive statistics of the data between 2009 and 2012 the Mean in the Above median/average groups are also lower than the Under median/average groups. Furthermore the Standard deviation in all the groups is again very high which shows that there is a lot of variance between the different sectors. The difference between the minimum and maximum is at his greatest in the group under average and under median with a difference of 137,4711. This implies that the difference between the highest inflation and lowest inflation growth is more 137%.
Another point of interest is the difference in the average group size. These groups are not equally divided. The reason for that is that there are some sectors where China has a lot of share of the total imports which has raise the average.

Except giving the Mean and standard deviation this Descriptive statistics do not give any answers regarding significant differences in these groups.

Independent T-test 1 data 2003-2006

Group Statistics

Groups divided with average share between 2003-2006

	GroupA	N	Mean	Std. Deviation	Std. Error Mean
Average	1	50	26,1548578	33,34300936	4,71541361
	2	24	3,7110958	15,07285312	3,07673326

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Average	Equal variances assumed	8,465	,005	3,139	72	,002	22,44375202	7,15074715	8,18900812	36,69851593
	Equal variances not assumed			3,986	71,853	,000	22,44375202	5,63040079	11,21938022	33,66814383

I will start again with the results of the groups divided on average between 2003-2007. Group 1 is the under average group with N=50 and group 2 is the above average group with N=24. The total N = 74 is lower than the results from 2009-2012 where N=99. This is because some sectors did not record price indices since 2003. As stated in the descriptive statistics the mean of the inflation between 2003 and 2007 is lower in the above average group. To research if this is a significant difference I use the Independent T-test for equality of Means.

Again I first have to do Levene's Test for Equality of Variance to decide which T-test I will need to use. The F-statistic of this test is 8,465 with a level of significance of 0,005. This implies that the null hypothesis of equality of variance in the two groups can also be rejected for this T-test which implies that there is a difference in variance between the two groups so we have to look at the bottom line for the results. The T-statistic of this test is 3,986 with degrees of freedom of 71,856 the significance level is 0.000 which implies that the null hypothesis of equality of Means can be rejected with a significance level of 5%. So there is a difference between the means in the two groups divided by average.

Independent T-test 2 data 2003-2006

Group Statistics

Groups divided with the median of 2006

	GroupM	N	Mean	Std. Deviation	Std. Error Mean
Median	1	37	29,1560055	37,58362314	6,17870958
	2	37	8,5955943	15,98469037	2,62786691

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Median	Equal variances assumed	15,567	,000	3,062	72	,003	20,56041118	6,71432324	7,17585242	33,94516994
	Equal variances not assumed			3,062	48,311	,004	20,56041118	6,71432324	7,08474408	34,05607828

Second, the outcome of the groups divided on the median sector share in 2009. Group 1 is the under median group with N=37 and group 2 is the above median group also with N=37. As stated in the descriptive statistics the mean of the inflation is lower in the above median group. To research if this is a significant difference I use the Independent T-test for equality of Means.

The F-statistic of the Levene's Test for Equality of Variance is 15,567 with a level of significance of 0.000. This implies that the null hypothesis of equality of variance in the two groups can also be rejected for this T-test which implies that there is a difference in variance between the two groups so we have to look at the bottom line for the results. The T-statistic of this test is 3,062 with degrees of freedom of 48,611. The significance level is 0,004 which imply that the null hypothesis of equality of Means can be rejected with a significance level of 5%. So there is a difference between the means in the two groups divided by the median.

Regression 2: Inflation - Share

Dependent Variable: INFLATION
Method: Least Squares
Sample (adjusted): 6 1360
Included observations: 750 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.060235	0.005580	10.79448	0.0000
SHARE	-0.100260	0.021164	-4.737256	0.0000

R-squared	0.029128	Mean dependent var	0.042839
Adjusted R-squared	0.027830	S.D. dependent var	0.116700
S.E. of regression	0.115065	Akaike info criterion	-1.483978
Sum squared resid	9.903466	Schwarz criterion	-1.471658
Log likelihood	558.4918	Hannan-Quinn criter.	-1.479231
F-statistic	22.44159	Durbin-Watson stat	2.045719
Prob(F-statistic)	0.000003		

In above regression is the inflation is the dependent variable with the share of imports from China as independent variable. I calculated the inflation rate using the following formula: **(index sector(x) (t) – index sector(x) (t-1)) / index sector(x)(t-1**).

The first result from the regression is that the share has a significant negative effect on the inflation rate. The t-statistic is -4.737256 which lead to a probability of 0.0000. Hence the null hypothesis of n effect can be rejected. The coefficient is -0,0100260. This says that every extra percentage point share of import from China leads to 0.1 percentage point lower inflation on average. However it is only a small explanatory effect because the r-squared has a value of 0.029128. This means that more than 97% of the change in the inflation is explained by other factors.
In the regression there is no sign of autocorrelation when looking at the Durbin-Watson statistic and to the Correlogram. However there is a sign of heteroskedasticity in the errors which makes the regression less strong. The F-statistic of the Breusch-Pagan-Godfrey test is 39.23237 and has a probability level of 0.0000. Therefore the null hypothesis of homoskedasticity has to be rejected. Moreover there is also a sign that the errors are not normal distributed because the Jarque-Bera statistic has a value of 1099.948. Therefore the null hypothesis of normality in the errors must be rejected (see Appendix 2 for all eviews outputs).

Regression 3: Inflation - percentage change of the share

Dependent Variable: INFLATION
Method: Least Squares
Sample (adjusted): 6 1360
Included observations: 740 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.043701	0.004233	10.32474	0.0000
SHARE_PERC_CHANGE	-0.001172	0.000491	-2.387456	0.0172

R-squared	0.007664	Mean dependent var	0.042804
Adjusted R-squared	0.006320	S.D. dependent var	0.115050
S.E. of regression	0.114686	Akaike info criterion	-1.490541
Sum squared resid	9.706798	Schwarz criterion	-1.478091
Log likelihood	553.5002	Hannan-Quinn criter.	-1.485741
F-statistic	5.699945	Durbin-Watson stat	2.010568
Prob(F-statistic)	0.017216		

In regression 3 I took again the inflation level as dependent variable. Only this time then independent variable is not the share but the percentage change of the share of the Imports from China per sector. So this regression tries to discover if the inflation rate of a sector is lower when the there is a growth of the imports from China by the United States per sector.

The regression shows that the percentage change of the share has a negative effect on the inflation rate with a coefficient of -0,007664. This implies that with a 1% change in the share of China in a certain sector the inflation of that year is 0,007664 percentage point lower on average. The t-statistic is -2,387456 with a level of significance of 0,0172. So this effect is significant with a significance level of 5% (0.0172<0.05). In the regression the Durbin-Watson statistics which is 2,010568. This is

extremely good because a value of 2 indicate no autocorrelation in the residuals. When looking at the Correlogram there is also no sign of autocorrelation in the first 2 lags. When you go further there is some autocorrelation but because this is not a regression on date it is useless to look at lags. However a very bad result is the r-squared. The r-squared only has a value of 0.007664 which is almost zero. So there is almost no explanation power in this regression. Furthermore this regression is tested on normality. The Jarque-Bera test has a value of 1153,537 with a probability of 0,000. So this means that the null hypothesis of normality must be rejected. However when looking at the graph it looks like a normal distribution but there are a few results that are so extreme that it makes the errors not normal distributed. The last test I conduct is the Breusch-Pagan-Godfrey test on heteroskedasticity. The F-statistic of the test is 0,000963 with a probability of 0,9753 so I cannot reject the null hypothesis of homoskedasticity (see Appendix 3 for all eviews outputs).

Regression 4: Percentage change inflation – Percentage change share

Dependent Variable: INFLATION_PERC_CHANGE
Method: Least Squares
Sample (adjusted): 7 1360
Included observations: 648 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.428182	0.684306	0.625717	0.5317
SHARE_PERC_CHANGE	-0.017375	0.074293	-0.233875	0.8152

R-squared	0.000085	Mean dependent var	0.413658
Adjusted R-squared	-0.001463	S.D. dependent var	17.33504
S.E. of regression	17.34771	Akaike info criterion	8.547880
Sum squared resid	194409.3	Schwarz criterion	8.561688
Log likelihood	-2767.513	Hannan-Quinn criter.	8.553237
F-statistic	0.054698	Durbin-Watson stat	2.302696
Prob(F-statistic)	0.815156		

In above regression I took the percentage change of the inflation as dependent variable and try to explain it with the percentage change of share of U.S. imports from China in the total import. By taking the percentage change for both of the variables, the regression now shows the elasticity between the two variables. The first and immediately the most important result is that the t-statistic of the independent variable is only -0.233875 which leads to a probability of 0.8152. Therefore the null hypothesis of no effect of the variable cannot be rejected. This is also visible in the R-squared which is very close to zero which implies that the percentage change in the share has a very small part in the percentage change of the inflation level. However this effect is still be negative which is in line with the previous two regressions. Because of the insignificancy of the regression there is no need for further analyse of the assumption of this regression (see Appendix 4 for all the eviews outputs).

Limitations

The first limitation is that the total group size between 2003-2006 and 2009-2012 differs. The total dataset between 2003-2006 consist of 74 sectors while the dataset between 2009-2012 is 99 sectors. That is because not all the price indices are available at 2003. So when comparing the two time frames with each other there is no hard evidence that they do or do not differ from each other.

The second limitation is the high variance between the different sectors. In the timeframe 2003-2006 the highest inflation rate over 4 years was 129,62617% while the lowest inflation rate was -27,31340. In the timeframe 2009-2012 the highest inflation rate over 4 years was 79,185% while the lowest inflation rate is -32,100%. Such extreme results can have an effect on the mean and standard deviation of the outcome. However when looking at the Jarque-Bera tests on normality there are a lot of outliers, but these outliers seems to be normal distributed to. So there is not much skewness in the regression. (see appendix 3 t/m 5)

A third limitation of this research is in regressions 3 and 4. The regression shows the effect of growth in the share of Chinese imports on the imported inflation rate in the United States. However it does not take into account that in some sectors there is already a high share of China in the import of the United States before 2003. This could lead to underestimation of the effect because it could be that these sectors already have a lower inflation rate and that the share has hardly increased in the last decade.

Interpretation

At first the results from the independent t-tests: After discovering and comparing the inflation means from 2003 till 2006 and 2009 till 2012 there is evidence that there is a lower inflation in sectors where China has above average or above median share in the total imports. However this is the same for 2003-2007 and 2009-2012 while the share of Chinese import where 5% lower in the timeframe 2003-2007 comparing to 2009 and 2012. The most remarkable result is that the mean inflation in 2003-2006 is lower compared to 2009-2012 in the above median and above average group while the share of Chinese import is 7 percent point lower than between 2009 and 2012. But as stated in the limitations this can be due to the smaller sample size and that the sectors with higher inflation rate are eliminated. However when the growth of the share of China in imports had a significant effect you should aspect to see a lower inflation rate in the above average/median group in the dataset 2009-2012 compared to 2003-2006 but that is not the case.
Regression 2 strengthened the point that the share of import from China has a lowering effect on the inflation. The regression shows that there is a negative effect of the share on the inflation level in the United States with a value of -0.100260. This implies that on average that every 1 percentage point share leads to a 0.10 percentage point lower inflation.

Regression 3 and 4 lends support to the fact that there is not a significant difference between the two timeframes in the SPSSS resulting, which is expected if the growth of the share has a significant effect on the inflation level. In regression 3 the change in the share of Chinese import in the total import in a given sector with as dependent variable the inflation rate is showed. There is a very small negative effect of share on the inflation of approximately -0.001172. However this is so small that the share has to growth with almost a 1000% in order to provide a decrease of 1 percentage point in the inflation rate. Furthermore the R-squared which is the explainable factor is very small (0.007664) what makes the regression even weaker. So there is an effect but very small.
In regression 4 the percentage change of the inflation rate is regressed against the percentage change in the share of import from China. This relationship is not significant and also has a very low r-squared which is close to zero. So the growth of the inflation rate cannot be explained by the growth in the share of import from China.

Finally regression 1; this regression shows the effect of the import price index on the total consumer price index of the United States. But since there is no strong evidence that the percentage change of the share of China in the total import contributes to a lower inflation rate on imported goods there is no reason to describe the effects on the consumer price index.

Conclusion

In this paper I attempted to answer the following Research question: “Has the trade with China a reducing effect on the inflation rate on imported goods”.

To answer this question I set up the following null hypothesis which I will answer in two: *The size of the share of China in a sectors total import by the United States has no influence on the inflation level in the same import sector.*

The combination of the Graph 1, Graph 2 on shows that products from China has a lower import inflation rate and has a lower volatility then the total inflation rate on imported goods. Also the comparison of the means between groups consisting of sectors with a high share of import from China and sectors with a low share of import from China shows that the group with the high share of Chinese imports has a lower inflation on imports. At last the regression between share and inflation shows a lowering effect of the level of share on the inflation level. However it cannot be ruled out that China especially exports goods that have an overall lower inflation rate. Therefore I cannot reject this null hypothesis.

Second there is a very weak relationship between the percentage change in share of Chinese imports of a certain sector and the inflation level of a certain sector which is almost negligible. Moreover there was not a lower inflation level between 2009-2012 in the sectors where china had a great share compared to 6 years earlier. In fact the average inflation was between 2003 and 2006 even lower in sectors where China has a great share. Also there is no relationship between the percentage change of the inflation and the percentage change of the share. This leads that I cannot conclude that a rise in Chinese share in a sector leads to a lower in price in that same sector.

In the end there is some evidence that the share of imports from China has a lowering effect on the inflation rate on imported goods. However there is not a very strong relationship between the growth of the share and the inflation rate and therefore there is more research needed in order to find out if China significantly contributes to a lower inflation rate in the United States or that it just exports goods with a very low inflation rate.

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Appendix

Appendix 1 – Regression 1

U.S. Imports Goods and Services - GDP

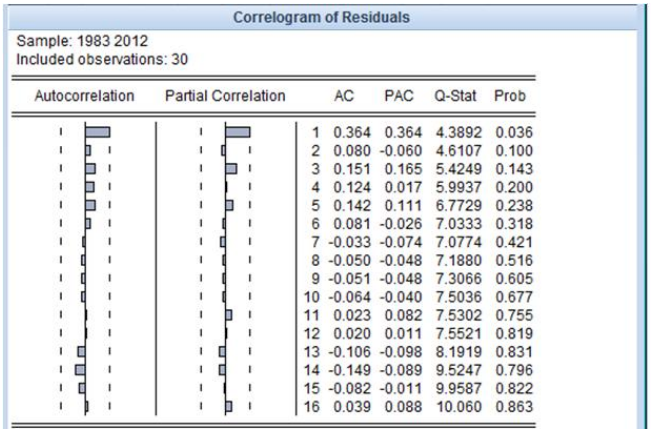
Value in millions of dollars
1983 through 2012

Period	Imports	GDP	Import/GDP	Average Import/GDP
	Total	Total	%	%
1983	323.874	3506900	0,092353361	**0,13034562**
1984	400.166	3900400	0,102596144	
1985	410.950	4184800	0,098200631	
1986	448.572	4425000	0,101372203	
1987	500.552	4698900	0,106525357	
1988	545.715	5061900	0,107808333	
1989	580.144	5439700	0,106649999	
1990	616.097	5750800	0,107132399	
1991	609.479	5930700	0,10276679	
1992	656.094	6261800	0,104777221	
1993	713.174	6582900	0,108337359	
1994	801.747	6993300	0,114645017	
1995	890.771	7338400	0,121384907	
1996	955.667	7751100	0,123294371	
1997	1.042.726	8256500	0,126291528	
1998	1.099.314	8741000	0,125765244	
1999	1.230.764	9301000	0,132325986	
2000	1.450.119	9898800	0,146494424	
2001	1.370.065	10233900	0,13387516	
2002	1.399.044	10590200	0,13210742	
2003	1.514.482	11089300	0,13657147	
2004	1.768.622	11797800	0,14991117	
2005	1.996.171	12564300	0,15887642	
2006	2.213.191	13314500	0,166224117	
2007	2.351.925	13961800	0,168454282	
2008	2.542.634	14219300	0,178815694	
2009	1.961.844	13898300	0,14115712	
2010	2.343.847	14419400	0,162548164	
2011	2.669.663	14991300	0,17808082	
2012	2.745.240	15684800	0,175025502	

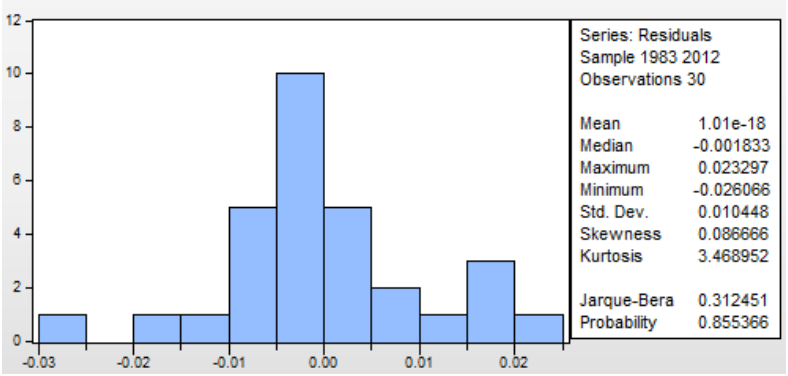
U.S. Census Bureau, Foreign Trade Division.

NOTE: (1) Data presented on a Balance of Payment (BOP) basis. Information on data sources and methodology are available at www.census.gov/foreign-trade/www/press.html.

Correlogram



Jarque-Bera test on normality in the residuals



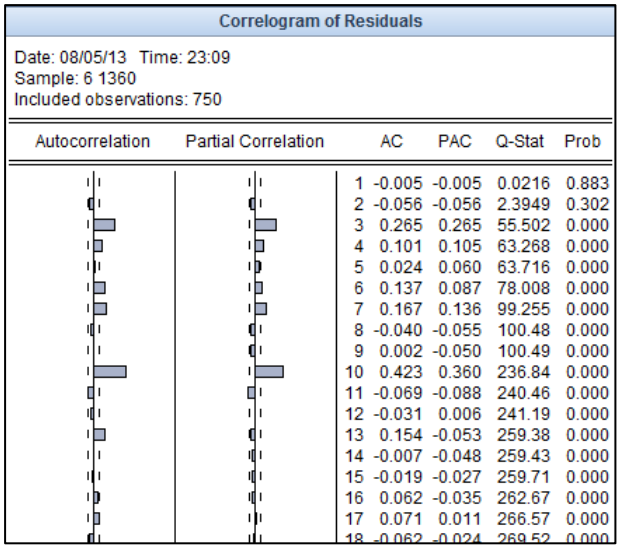
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.540523	Prob. F(1,28)	0.4683
Obs*R-squared	0.568164	Prob. Chi-Square(1)	0.4510
Scaled explained SS	0.610984	Prob. Chi-Square(1)	0.4344

Appendix 2 - Information regression 2,3,4

Name used in eviews	Description
End code	5-digit end use code (text)
Sector	Sector corresponding to end code (text)
Year	2003-2012
Share	Import China(t)/Import Total(t)
Dln_share	ln share(t) - ln share (t-1)
Share_perc_change	(share(t) - share(t-1)) / share(t-1)
d_share	share(t) - share(t-1)
Index	Import price index United States with different base years
dln_index	difference of ln index(t) - ln index(t-1)
Inflation	(index (t) – index(t-1)) / index (t-1)
Inflation_perc_change	(inflation(t) – inflation(t-1)) / inflation(t-1)
D_index_	index(t) - index(t-1)
Import_Total	Import United States from the world per sector in millions of dollars
Import_China	Import United States from China per sector in millions of dollars
Dln_import_total	difference of ln import_total(t) - ln import_total(t-1)
Dln_import_china	difference of ln import_china(t) - ln import_china(t-1)
t	End code with a corresponding sector in a certain year.
t-1	End code with a corresponding sector en a certain year(-1)

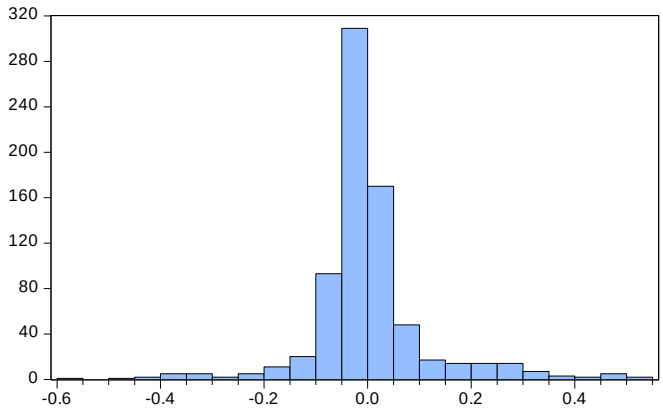
Appendix 3 – Regression 2



Correlogram of Residuals

Date: 08/05/13 Time: 23:09
Sample: 6 1360
Included observations: 750

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.005	-0.005	0.0216	0.883
		2	-0.056	-0.056	2.3949	0.302
		3	0.265	0.265	55.502	0.000
		4	0.101	0.105	63.268	0.000
		5	0.024	0.060	63.716	0.000
		6	0.137	0.087	78.008	0.000
		7	0.167	0.136	99.255	0.000
		8	-0.040	-0.055	100.48	0.000
		9	0.002	-0.050	100.49	0.000
		10	0.423	0.360	236.84	0.000
		11	-0.069	-0.088	240.46	0.000
		12	-0.031	0.006	241.19	0.000
		13	0.154	-0.053	259.38	0.000
		14	-0.007	-0.048	259.43	0.000
		15	-0.019	-0.027	259.71	0.000
		16	0.062	-0.035	262.67	0.000
		17	0.071	0.011	266.57	0.000
		18	-0.062	-0.024	269.52	0.000



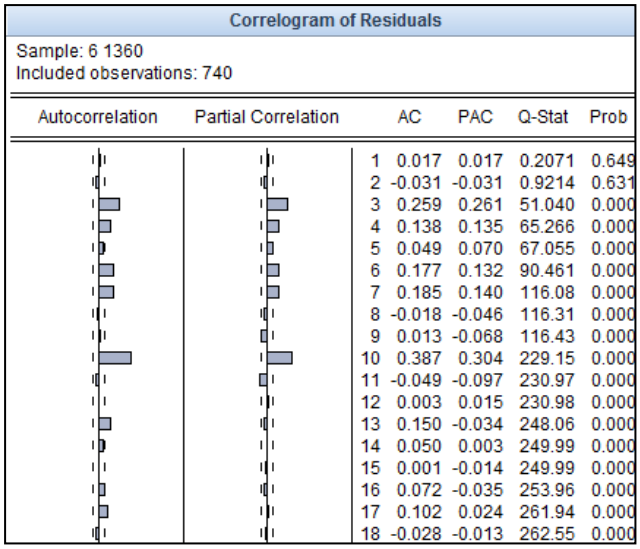
Series: Residuals
Sample 6 1360
Observations 750

Mean	-2.54e-17
Median	-0.014212
Maximum	0.523421
Minimum	-0.554834
Std. Dev.	0.114988
Skewness	0.711545
Kurtosis	8.759615
Jarque-Bera	1099.948
Probability	0.000000

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	39.23237	Prob. F(1,748)	0.0000
Obs*R-squared	37.37686	Prob. Chi-Square(1)	0.0000
Scaled explained SS	144.2427	Prob. Chi-Square(1)	0.0000

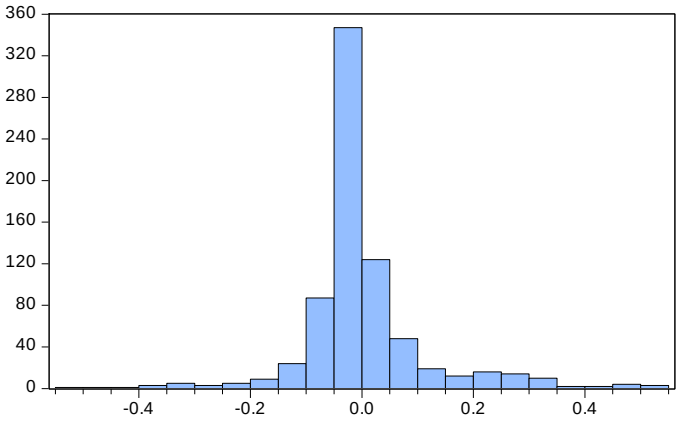
Appendix 4– Regression 3



Correlogram of Residuals

Sample: 6 1360
Included observations: 740

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.017	0.017	0.2071	0.649
		2	-0.031	-0.031	0.9214	0.631
		3	0.259	0.261	51.040	0.000
		4	0.138	0.135	65.266	0.000
		5	0.049	0.070	67.055	0.000
		6	0.177	0.132	90.461	0.000
		7	0.185	0.140	116.08	0.000
		8	-0.018	-0.046	116.31	0.000
		9	0.013	-0.068	116.43	0.000
		10	0.387	0.304	229.15	0.000
		11	-0.049	-0.097	230.97	0.000
		12	0.003	0.015	230.98	0.000
		13	0.150	-0.034	248.06	0.000
		14	0.050	0.003	249.99	0.000
		15	0.001	-0.014	249.99	0.000
		16	0.072	-0.035	253.96	0.000
		17	0.102	0.024	261.94	0.000
		18	-0.028	-0.013	262.55	0.000



Series: Residuals
Sample 6 1360
Observations 740

Mean	1.03e-17
Median	-0.019651
Maximum	0.539044
Minimum	-0.539468
Std. Dev.	0.114608
Skewness	1.016760
Kurtosis	8.768606
Jarque-Bera	1153.537
Probability	0.000000

Heteroskedasticity Test: Breusch-Pagan-Godfrey

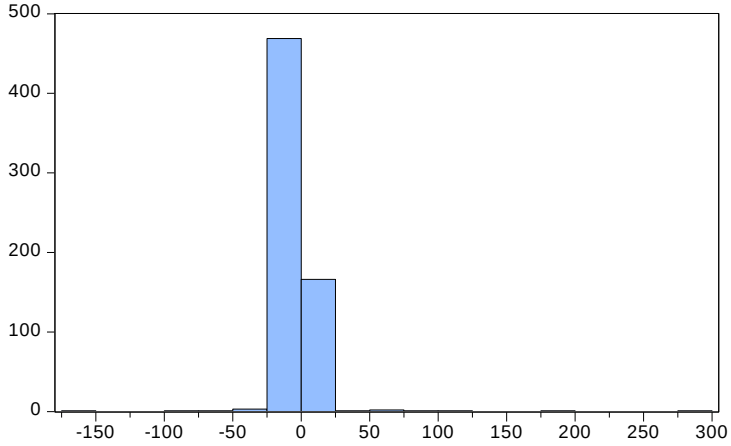
F-statistic	0.000963	Prob. F(1,738)	0.9753
Obs*R-squared	0.000965	Prob. Chi-Square(1)	0.9752
Scaled explained SS	0.003729	Prob. Chi-Square(1)	0.9513

Appendix 5 – Regression 4

Correlogram of Residuals

Sample: 7 1360
Included observations: 648

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.002	-0.002	0.0037	0.952
		2	0.001	0.001	0.0045	0.998
		3	0.001	0.001	0.0053	1.000
		4	-0.006	-0.006	0.0308	1.000
		5	-0.007	-0.007	0.0604	1.000
		6	-0.021	-0.021	0.3368	0.999
		7	-0.003	-0.003	0.3438	1.000
		8	-0.001	-0.001	0.3443	1.000
		9	0.016	0.016	0.5089	1.000
		10	-0.009	-0.009	0.5582	1.000
		11	-0.007	-0.007	0.5886	1.000
		12	-0.002	-0.002	0.5902	1.000
		13	0.010	0.010	0.6531	1.000
		14	-0.002	-0.002	0.6550	1.000
		15	-0.116	-0.116	9.6446	0.841
		16	0.001	-0.000	9.6447	0.885
		17	-0.001	-0.001	9.6457	0.918
		18	-0.002	-0.002	9.6488	0.943



Series: Residuals
Sample 7 1360
Observations 648

Mean	1.10e-16
Median	-0.783985
Maximum	291.5473
Minimum	-161.4377
Std. Dev.	17.33430
Skewness	8.725201
Kurtosis	166.5032
Jarque-Bera	730021.1
Probability	0.000000

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.031054	Prob. F(1,646)	0.8602
Obs*R-squared	0.031148	Prob. Chi-Square(1)	0.8599
Scaled explained SS	2.561681	Prob. Chi-Square(1)	0.1095