Rising import shares from China:

How does it affect the Norwegian economy?

by

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Preface

Supervisor at the Department of Economics at the University of Bergen was Professor Erling Vårdal. Co-supervisor was Associate Professor Arild Aakvik. I would like to thank them both for valuable suggestions regarding my thesis.

It was inspiring for me that many people around me found the topic of this thesis engaging. I would like to thank all who have given comments and discussed it with me. These include friends and family, and fellow economics students. A special thanks to Hans-Petter Hanson and Kristel Stene for many valuable comments and great support. Also thanks to Andrea Kritcher and Torbjørn Håvås Tjønn for proofreading my thesis.

Kristina Håvås Tjønn, Bergen 1. desember 2007

Summary

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Teaching supervisors: Erling Vårdal and Arild Aakvik

This paper evaluates the theoretical and empirical evidence on the question of whether Chinese import has an effect on the import level and inflation level in Norway. In terms of empirical evidence a fixed effect estimation model is used to capture the effect of sector groups. The statistical program STATA is used.

The empirical work indicates that ”low- priced”-goods from China have a significant effect on both the total value of import and the import price level. However, this effect is surprisingly small.

Key words: China, prices, inflation, product groups

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Chapter 1: Introduction

Since Deng Xiaoping open up China` s economy for the rest of the world in 1978, the country has experienced an increasingly growth rate. In 2005 the growth in China was approximately 9.5 percent, a trend of high growth rate that is not going to change in the near future[1]. During the last couple of years, the whole world has seen a long-term "disinflationary" trend, that is widely observed in both industrial countries and emerging countries, e.g. the United States and Japan. In the last couple of years, this trend was also observed in Norway, which has experienced particularly low inflation rates, inhibiting the desired inflation goal of two and a half percent. Observers point to China as a source of downward pressure on global prices as the issue of deflation becomes more prominent[2]. Inflation is primarily characterized as a function of domestic factors such as productivity, aggregate demand, wages processes, external shocks, inflation expectations, and the consideration of national monetary policy. Recently, economists have suggested that globalization is diminishing the role of the domestic factors in the inflation process and allowing global developments to have a greater impact[3]. To what extent globalisation and emerging markets have replaced domestic with international factors as a main determinant of inflation is the subject of active debate. Therefore it is no surprise that monetary policymakers have taken an active interest in the topic regarding globalization and inflation. Ben Bernanke, the Chairman in the Federal Reserve Board notes that even though globalization has not *"led to significant changes in the process that determines the U.S. inflation rate…effective monetary policy making now requires taking into account a diverse set of global influences, many of which are not fully understood"* [4].

These concerns derive from several factors. First; in recent year, Chinese exports have continued to grow strongly despite the economic slowdown of world trade, leading to increased market shares for China. Secondly, the consumer prices in China have been relatively flat or declining in the last couple of years. With the Chinese exchange rate fixed to the dollar, this is a sign of declining Chinese export prices. Thirdly, China has a great ability to attract foreign direct investment. Lastly, China has become one of the worlds largest

[1] http://www.tu.no/nyheter/fagartikler/article35260.ece
[2] Kamin (2004)
[3] Ihrig(2007)
[4] Bernanke, B. S. (2007). Globalization and Monetary Policy. Speech at the Fourth Economic Summit, Stanford Institute for Economic Policy Research, Stanford,CA.

exporters of manufactured goods, causing a downward pressure on goods produced outside China. The world has now better excess to “exclusive goods” at a lower price. However, China has a need for raw material and primary goods, as it experiences industrialisation and infrastructure construction, putting and upward pressure on world prices of key commodities. This is beneficial for Norway’s economy, as Norway produces fuel that is not comparable, e.g. cheaper goods and inexpensive labor, to what China has to offer. Therefore, there is no reason for a significant decrease in the demand for Norwegian goods.
((Greene 2006) , (Kamin 2004; Greene 2006),(Koyuncu 2006))

The idea of China’s contribution to declining inflation rates is not universally shared (ex. (Anderson 2002), (Hu 2003), (Hanke 2003)). Critics argue that, even if China’s economy has grown significantly, it has only accounted for about six percent of global merchandise exports and four percent of Gross Domestic Product (GDP) in 2003, not sufficient to restrain the price level (Kamin 2006). Also, China’s export growth has been associated with a comparable import growth, contributing to global demand as well as supply. As noted earlier, it is also thought that China is boosting global commodity prices (Morrison 2003).

In the light of this it would be interesting to look at the impact of China, as a trading partner, and the effect it has on the Norwegian economy. However, there is not a lot of Norwegian literature that shed light on this topic and my thesis research will mainly be based on foreign research. The purpose of the paper is to answer the following question. Does the expansion of supply capacity in China, have a subduing effect on Norwegian inflation? Also, how significant is this effect? In this paper, these questions will be addressed by assessing the impact of China’s import share size on the CPI and total import share of certain groups.

Before proceeding, some initial presumptions should be addressed. Over a long period of time the rate of inflation will be determined by domestic monetary policy. The argument that the inflation process is primarily affected by global economy is valid for a short-term to medium-term basis. For example, foreign shocks that effect prices or level of supply may temporarily influence a country’s domestic inflation rate. Over time, divergence in the desired inflation rates set by monetary authorities should result in monetary policy actions designed to restore these rates to their original target amount.

The plan of this paper is as follows. Chapter 2 presents supplementary information regarding the problem that will be addressed in this paper. Chapter 3 describes the theoretical analysis of the impact that China, a growing trading nation, has on global prices. In chapter 4, the dataset is presented and also the empirical strategy for the regressions. In Chapter 5, the different estimation methods are described, while the results of the regression models are presented in Chapter 6. In the last chapter, chapter 7, a short summary will finish it all.

Chapter 2: Theory and earlier research

The purpose of this chapter is to clarify the definition of an emerging economy and its effect on the Norwegian import pattern. Chapter 2.1 describes the effect of emerging economies on global trade and thereby the countries inflation rates. Chapter 2.2 describes China as an emerging economy, and its increased effect on the global trade after joining the World Trade Organisation. This is followed up in chapters 2.2.1, 2.2.2, and 2.3 that discuss China's export pattern and the influence of exchange rate development on China's export pattern and Norwegian import. Chapter 2.4 focuses on earlier empirical research of this subject. Here, I mainly focus on import prices and inflation research. These results will set the standard of comparison for my discoveries.

2.1 Emerging economies

Emerging economies are driving global growth. With 80 percent of the world's population shares, increased energy consumption, growing export, and GDP shares, emerging economies have a big impact on the inflation, interest rates, wages, and profits of developed countries[5] (Economist 2006). These economies account for over half of the world's GDP, measured at purchasing-power parity, which takes into account lower prices in impoverished countries. At marked exchange rates, however, their share is less than 30 percent. Regardless, they accounted for over half of the increase in global output in 2005 and, at the same time, their share of the worlds exports jumped from 20 percent in 1970 to 43 percent in 2005 (Economist 2006). Thanks to emerging economies, world economies have grown by an average of 3.2 percent a year. According to *The International Monetary Fund* this trend will be ongoing. Their forecasts show that, in the next five years, emerging economies will grow at an average rate of 6.8 percent per year, whereas the developed economies will achieve only 2.7 percent per year[6].

The phenomenon that emerging countries have grown faster than developed countries is not new. Reasons for their increased influence today, as opposed to past years, is because they have recently become more integrated into the global system of production. After the integration of China and other developing countries into the world trading system, big shifts in relative prices and incomes from labour, capital, goods, and assets were observed (Economist 2006). In theory, the long-term real equilibrium interest rate should be equal to

[5] Numbers from 2005
[6] The new titans. The Economist

the marginal return on capital. This is the interest rate that makes sure that savings equal investment. However, the rise of emerging economies has increased the ratio of global labour to capital, raising the return on capital, and real interest rates rise instead of fall. According to the Economist (2006), the trend of real interest rates should be approximately equal to the trend rate of GDP growth. If greater global economic and financial integration lead to a more efficient use of labour and capital, economic growth would be faster and real interest rates would rise. Therefore, what causes low interest rates that are observed all over the world?

The trade and capital flow accelerating relative to GDP in the past ten years have been rising and the difference between the old and the new world are bigger. In summary, there is a long-term disinflationary trend all over the world, including both industrial countries and emerging countries. This disinflationary trend is also seen in the export and import of goods.

2.2 China; an emerging economy

As one of the largest global producers with major growth in supply and demand, China contributes to the world economy to become a truly global economy. "After 15 years of negotiations, China became the 143rd member of the World Trade Organization (WTO) on 11 December 2000." (Greene 2006) As a result of joining the WTO, China underwent substantial tariff reductions and a dismantling of most non-tariff barriers (NTBs). From 1992 to 2001 the simple average Chinese tariff rate for all products decreased from 42.9 percent to 16.6 percent (Greene 2006). China's accession to the WTO also ensures a secure and liable trading environment for both China and its trading partners. China was required to adopt key disciplines and principles that promote "good" economic policies such as eliminating geographical limitations and opening up service sectors to foreign collaboration. Also, the WTO supports China and its domestic liberalisation to ensure economic growth and global integration. After joining the WTO, there has been an improved market accession that may pose significant challenges for Chinese authorities in the future, for example, if the WTO placed a constraint on China's export growth (Blancher 2004). Rapid economic growth, mainly due to changes in governmental policies, resulted in a more liberal market economy, e.g. key economic institutions are led by public ownership. Initial alterations in the agricultural sector occurred shortly after. Small changes were made in the manufacturing industry and in large parts of the services sectors. As a result, more capital investments have been financed by large domestic savings and an increasingly productivity growth that have boosted the economic growth.

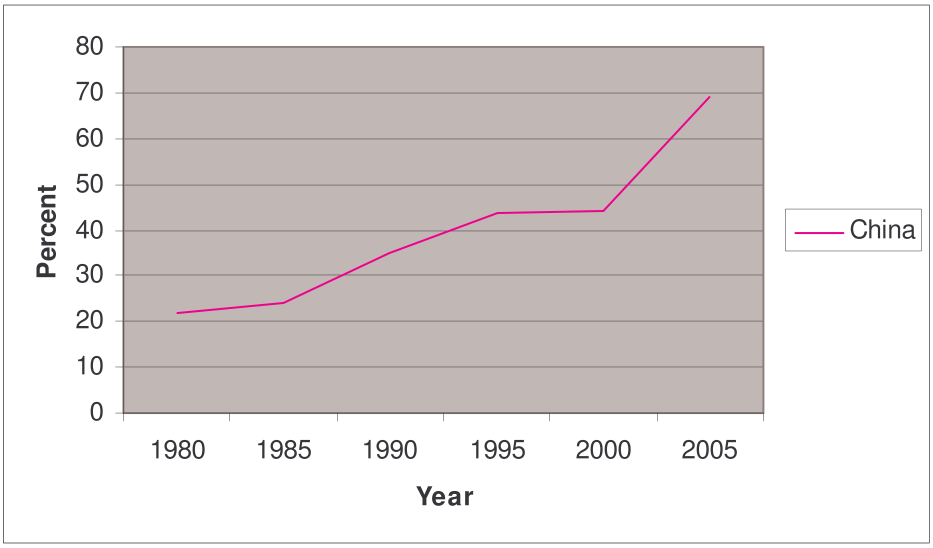
When a large country like China supplies additional products the world economy, price levels will undoubtedly be affected. Since China is a net exporter of manufactured goods and a net importer of natural resources, pressure is exerted on prices in more than one way. First, the integration of China has exerted a downward pressure on inflation by increasing competition from these lower-cost producers. The increased supply has caused a reduction in price pressure on labour-intensive manufactured goods and, therefore, production costs at any given rate of growth reduce the cost fighting inflation. Secondly, rapid growing industrialisation causes the demand for natural resources and raw material to increase. This pressure on natural resources causes an increase in commodity prices. However, an increase in Chinese demand for natural resources and raw commodities has both positive and negative effects on the world economy. An increase in demand, causing greater export volumes and world prices, is beneficial for producers. However, the increase in prices has a negative effect on the importers of raw material (Greene 2006). For example, higher oil prices do not result from restricted availability but from greater demand, by developing countries, for the good.

2.2.1 Export from China

China's trade flow

In recent years, China has become more integrated into the world economy and trade levels have expanded considerably. The extent to which China has opened to foreign trade can be illustrated by its share of total trade, both export and import, in GDP over time. According to the *World Bank Development Indicators*, trade contributed 21.8 percent to Chinese GDP in 1980, and a massive 69 percent in 2005 after China joined the WTO. This trend is illustrated in the following plot of Chinese share in GDP as a function of time over the past twenty-five years:

Figure 2.1: Chinese share of trade in GDP



Source: World Bank, World Development Indicators Database

Over the last couple of years Chinas trade pattern has drastically changed. There has been a large increase in China's export share and export to other countries has become more diverse. In 2004 the Chinese export of goods accounted for 90 percent of China's total export share, with the remaining 10 percent as the export of services. Compared to the world average, which is a little over 80 percent, China has a noticeable higher export of goods. However, the export of services has the opposite trend, where Chinese export is a little less than 10 percent and the world average is approximately 20 percent. Therefore, the trade of goods mainly drives China's integration into world trade. During the period from 1979 to 2005, China's share in world trade of goods has increased from less than 1 percent to 6.4 percent (Greene 2006). In 2005, China was the third largest trading nation, after the United States and Germany, where China's major trading partner was the European Union (EU), followed by the United Nations and Japan (Greene 2006). Trade between the EU and China has expanded during the last couple of years, more than doubling from 1999 to 2003.

China has often been associated with cheap textile and leather goods like footwear, clothing, and other light manufactured goods, comprising 40 percent of China's export in the early 1990's. The remaining portion of export consisted mainly of machinery and other small electronic goods. In recent years these divisions have changed, as confirmed by the European Commission's "European Competitiveness Report" (2004). From 1995 to 2002, China's export relations changed from primary low-skilled labour-intensive products to more high-skilled, human-capital-intensive products (Commission 2004). China now provides the world with more sophisticated electronic goods such as office machines, automated data processing equipment, telecommunications and sound equipment, and other electrical machinery, along with furniture and industrial supplies. Some of the largest scale import groups are office equipment, computers and clothes. Previously, this area was dominated by Japan. While Japan is experiencing a decrease in the share of such products, the opposite is true for China. The portion of Chinese exports represented by machinery and small electronics increased from 17 percent in 1993 to 41 percent in 2003 (Blancher 2004). This is because the majority of products from Japan are four times the cost of Chinese goods (M.Molnar 2005). In the period of 2000 to 2004, for products where the Chinese unit price is comparable to the Japanese price, Japan's product share to the US has declined from 80 to 70 percent, whereas China's share to the US has increased from about 7 percent in 2000 to 10 percent in 2004. Molnar explanations why products with large unit-price differentials are decreasing and products with small unit-price differentials are increasing in two different ways (M.Molnar 2005). First, Japanese firms may be lowering their prices to remain competitive. Secondly, Chinese companies may be exporting more goods of comparable quality to Japanese products to move up the value chain and become more competitive.

During the last couple of years the export prices of textile and clothing from emerging economies like China have declined by more than 7 percent since the mid-1990s. However there has been an even larger decline in prices of electronic products since the same period. The world export price index of clothing and leather fall by as much as 20 percent and the electronic equipment by 3.4 percent. This is due to an abundance of low skilled labour in exporting countries like China (Greene 2006; Malory Greene 2006).

2.2.2 Exchange rate development in China

In the 1980`s China employed a fixed exchange rate system. However, the renminbi (Yuan) was frequently devalued, despite this fixed rate system, reflecting the wake from opening up the economy. From 1988 to 1993, China engaged a dual exchange rate system. The fixed renminbi coexisted with the market-determined rate in swap centres where exporters, importers, and other parts that had foreign supply or demand for exchange rate, could transact at a market-determined exchange rate. In the early 1990`s the fixed official exchange rate was increasingly overvalued and the swap exchange rate experienced a significant depreciation. It wasn't until 1994 that the official rate was devalued and unified with the swap exchange rate. Then, the exchange rate system was officially changed into a managed floating exchange rate system. Since then, China has officially employed a floating exchange rate system, though the currency has been de-facto fixed to the US dollar since 1995 (Wang 2004). The 1994-devaluation of the Chinese currency (from 5.8 to 8.3 RMB/Yuan per US dollar) is often cited as a critical factor responsible for the extraordinary growth of Chinese exports and its increasing competitiveness" (Greene 2006). After the year 1994, China's global export share increased significantly when the US renewed China as a favoured trading nation (Koyuncu 2006). Even though the Chinese exchange rate is fixed to the US dollar the nominal rate has been anything but stable. It has been experiencing sharp swings in the real effective exchange rate (REER). Throughout the 1980`s and early 1990`s the REER experienced periodic and drastic depreciations after the opening of Chinas economy. While in the time period mid-1997 to mid-1998, with the renminbi held stable against the US dollar, China's REER appreciated. This was mostly due to the depreciation of the Japanese yen and currency of other countries that experienced the Asian crisis. This situation, with an appreciating renminbi, was soon reversed as Asian currency rebounded and inflation in China was much lower than its trading countries. After this, China's inflation rate continued to be lower than its trading partners. There was a modest appreciation of the renminbi by 13 percent in 2000-01, but again in 2002-03 there was a 10 percent depreciation of the currency, reflecting the US dollars movements against other currencies[7] (Lardy 2005). Based on this, some argue that increased Chinese influence on the world economy is determined by the favourable exchange rate. In the last couple of years the Norwegian kroner has become considerably stronger than the US dollar. In 2004, 40 percent of Chinese goods were priced billed the American dollar resulting in relatively cheaper goods from China. With relatively lower prices Chinese goods automatically became more interesting as import goods. This poses the idea that China is so competitive because of the undervalued exchange rate.

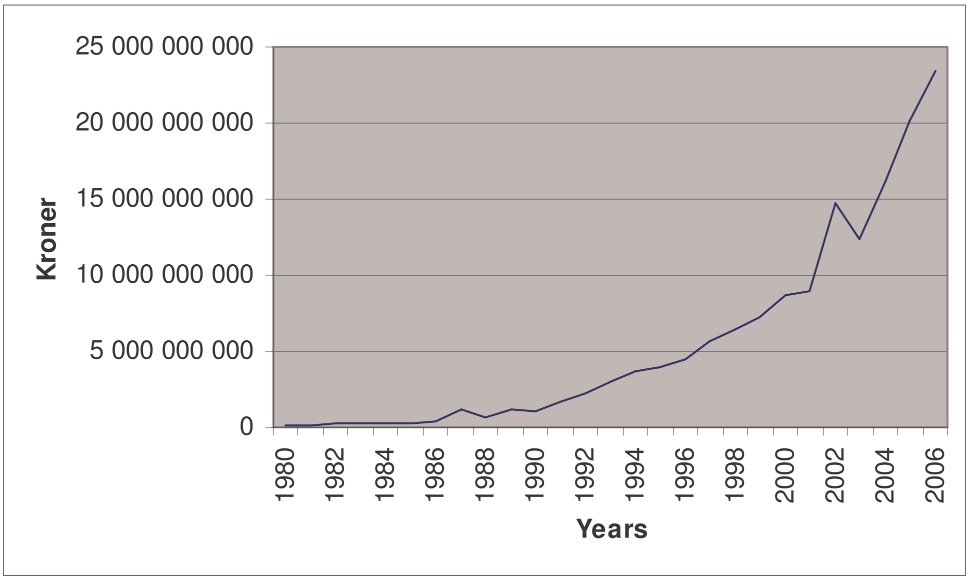
There is little disagreement that the RMB is undervalued, with many theoreticians researching this topic. Using World Bank data, Adams (Adams 2006) implies that an equilibrium rate of a pegged exchange rate should, for instance, be 1.4 rather than 8.3 RMB per Dollar. According to this, China's undervaluation is greater than many other East Asian countries. The greatest degree of undervaluation is observed in products that have high influence in Chinese export trade, e.g. wood products, leather products, machinery, and equipment. For example, textile and clothing indicate an undervaluation of almost 50 percent (Adams 2006).

[7] Calculations is based on the J. P. Morgan series on China's real effective exchange rate index

2.3 Norwegian import

Recently, Norway has been experiencing more international trade and capital transactions, though this has not always been the case. In the last hundred years, Norway imported more than it exported, causing it to become in debt. After Norway began to extract oil in 1990, the trade process completely changed and Norway exported more than it imported. As a result, other countries became indebted to Norway. In 2005, most import shares were from Sweden, however, more recently, Norway is importing more and more goods from China.

Figure 2.2: Development in import from China



Source: SSB

In 2004, China was the fifth largest supplier of traditional goods to Norway, surpassed only by Sweden, Germany, Denmark and Great Britain[8]. The most popular goods from China are clothes and computer facilities. Import values for machines have more than doubled from 2001 to 2004. Among these machines, office supplies and electronic- data-processing-equipment have expanded by 359 percent and telecommunication equipment by 334 percent, both more than quadrupling from 2001 to 2004[9]. In 2001, only three per hundred of these goods came from China, whereas in 2004 one out of every five cell phones in Norway were made in China. Even for a large increase in the import of electronic goods, clothes and accessories still remains the largest import group. The share of clothes and accessories is no more than 19 percent but has an import value of 3.7 billion. This means that clothes and

[8] http://ssb.no/emner/09/ur_okonomi/

[9] ssb.no

accessories represent almost 65 percent of the import share from China in 2004[10]. However, the import share of these products is still only 1.2 percent of the total import. Globalization continues to be a greater part of the Norwegian trade pattern. In only a year, Norway expanded the import share from China by 24 percent and by 2005 China had a 4.96 percent total import share in Norway.

2.4 Earlier research

Since the beginning of the century, there has been significant discussion about China and whether transmissions of inflation between trading economies occurs. Such statements are based on the concern regarding China's currently large account surplus and that it adds more supply to the economy than demand. When the world acquires more supplies of manufactures goods, it brings competition into the world trade market, which leads to a downward pressure on prices and lost market share (Kamin 2006).

Several models of international economic theory consider the transmission of inflation between economies that trade. A study by Claudio Borio and Andrew Filardo (2006) (Borio 2006) confirms that inflation rates in developed economies have become less sensitive to the domestic output gaps, whereas global economic conditions have become more important. This implies that it is more reasonable to consider an open economy than a closed one. In an open economy, an increase in demand can be met by imports, so it has less effect on inflation. Cheaper goods from China not only reduce the prices of imports, but the prices of all goods sold in competing domestic markets .Therefore, they also restrict the inflation of non-traded goods. Nevertheless, as Borio and Filardo point out, import prices are not a "sufficient statistic" for the influence of the global economic markets on domestic prices. This is an accepted statement because import prices only capture the cost of goods and services that are actually imported. They do not capture the cost of other goods that could potentially be imported if domestic prices rise too much above their foreign counterparts. Also, since many domestic corporations sell their products, both in the domestic and foreign markets, charged prices for domestic markets could possibly be influenced by achievable charged prices in foreign markets. The extent to which these prices are correlated with import prices is not exactly clear. Furthermore, as previously noted, the effect of foreign resource exploration on domestic inflation may be reflected in, for example, factor markets, differences in wages, and the threat of off-shoring, rather than through import prices alone.

[10] Main numbers collected from Statistics of Norway (SSB)

To consider the effect of China on Norway, the two-country model developed in the article from Clarida, Gali and Gertler (Clarida 2002) can be used. In the article, it is illustrated that if the central banks of the two countries act cooperatively, inflationary pressure can spill over from one country to the other. Because of this, the cooperative policy-makers would take into account foreign inflation as well as home inflation. For example, if the cost level were decreasing, this would cause the country's inflation level to decline. The central bank of this country would change their policy to contract output. The central bank of the other country would react to this with more strict lines to lower the domestic output gap that decreases domestic marginal costs and domestic inflation. However, if the countries adopted a non-cooperative strategy, central banks would prevent the domestic output and foreign inflation to spill over across the countries.

A discussion on how to measure foreign price development and its effect on the price of Norwegian consumer goods can be found in Røstøen (Røstøen 2004). Instead of looking at the development in traditional indicators, such as commodity prices and trading partners aggregated consumer prices, this article presents a new alternative indicator. With large differences in each product group, price development, and import pattern, Røstøen chose to put more focus on a few product groups from select countries, in order to obtain a more accurate measuring device. A microscopic approach gives a better impression of the international price impetus. This new indicator is designed from a weighted arithmetic average on the price development from goods such as clothes, shoes, sound equipment, vision equipment, and other goods. The main index is comprised of these 7 other indices. In the KIP-JAE index these 7 groups only account for 33 percent of the total index while, in the alternative index, these groups account for 100 percent. Using a new indicator causes some uncertainty. Among other things, it is hard to estimate the precise effect of an import change from high-cost country to a low-cost country. The World Bank estimates the extent to which consumers can get goods and service for a fixed amount of money. Products produced for export are more likely to be capital-intensive than the general production that is part of the GDP. Also, there is a big possibility that low-cost countries will set the export price marginally lower than its competitors to win market shares. Because of this, the price level of export goods may be higher than calculated from the GDP that is corrected for purchasing power level. On the other hand, the new indicator may over-evaluate the inflationary force from abroad. Due to the evaluation, many of Norway's goods are based on the consumption of its trading partners as opposed to Norwegian consumers. Regardless, this paper assumes the new indicator to be a better measurement for the price development due to foreign influence.

The IMF (Fund 2006) study does not directly establish the fact that inflation from industrial countries has become increasingly sensitive to import prices. However, greater import shares in particular sectors lead to a decline in the relative rate of inflation, but the estimated effect is very small; *"about one-tenth of change in import prices passes through to overall inflation the first year"*, and after a couple of years the effect is nearly nonexistent.

In (Kamin 2004) a model that allows Chinese prices to effect importers consumer prices in three channels is employed. First, as a direct effect, cheaper import goods lower the price index in the importing country. Secondly, China has lower production costs, and thus, lower foreign nominal wages and inflation. Thirdly, China's cheaper export prices could potentially lower prices for importing countries by turning the demand to Chinese goods. The producers then have to lower prices to prevent loosing marked shares and profits. Econometric results show evidence of a negative correlation between the inflation rate at a sector level and changes in import shares from China. They look further into this by dividing the sectored inflation into two periods, 1993-97 and 1997-2002. In both of the periods, the relationship between the inflation rates is generally positive, except for a few outliers. In particular, the "prices of green coffee rose by 21 percent in the 1993-1997 period and then feel by 22 percent in the 1997-2002 period" (Kamin 2004). They found that a point rise of one percent in the Chinese import share of a given sector during time period of 1997 to 2002 would lower the annual import inflation in that particular sector by 0.70 percent. This result suggests that Chinese import has suppressed the US import inflation to some extent.

In 2007, Ihrig et al. (Ihrig 2007) a study of 11 countries with focus on the sum of estimated coefficients on changes in import prices. By comparing results from the period 1977-1990 with those from 1991-2005 periods, they found that there is *"no evidence of generalized increase in the sensitivity of inflation to import prices; the coefficient on import prices increased in only four of the ten countries"*[11]. However, when they used estimates for the entire period 1977-2005, the coefficients for an interaction term, import price multiplied with

[11] Ihrig(2007), page 25.

import share, was statistical significant. This indicated that higher import shares raise the effect of import prices on inflation. Nevertheless, the coefficients are very small, roughly 0,1; "*they suggest if the ratio of imports to GDP is 20 percent, a rise in import price inflation of 1 percentage point boosts inflation by only 0,02 percentage point*"[12]. Given this, they conclude to have only weak evidence for import prices that significantly affect CPI inflation and that this effect has been raising over time. These findings are rather surprising, as they would expect globalization and increases in trade to grant import prices a larger influence on inflation. Their explanation for these findings is that in the 1991-2005 period the inflation rates in industrial economies are subject to fewer large shocks and are therefore experiences less volatility in inflation rates, because of this it may be harder to identify effects of import prices econometrically.

Koyuncu and Yilmaz (Koyuncu 2006) examine China, as an exporter, too see if China can help lower world inflation. By using data form 1994 to 2003, they argue that China's export is an important contributor to lowering inflation in importing countries. In the regression analysis four variables is used; exchange rate, logarithmic transformation of the inflation rate, import ratio, and gross domestic product. After testing a lot of fixed effect models (FEM) and random effects models (REM) they find a negative correlation between the share of a country's imports from China and the rate of inflation in that particular country during the estimation period. More exactly, the average result of the estimated coefficient on the logged import ratio from China is negative 0.17 percent.

These models focus on the direct effect China has on other countries. These models neglect an important component, the indirect effect. Cheap exports to third countries, such as those in the vicinity of the US, could lower costs in those countries and enable the US to export cheaper goods to the European Union or Norway. These models are not taking into concern the fact that China's increasing productivity is also increasing the demand for natural resources. An increase after having scarce resources will lead to higher prices and therefore higher marginal production costs. In the end this could lead to higher consumer prices in export destination countries.

[12] Ihrig (2007), page 26.

Chapter 3: The Two Countries Model

This chapter is closely based on Kamin (2004) `s model that focuses on two countries where each country produces one separate good. I use the model to show how an increase in the capacity to supply in emerging economies may cause the global price level to slow down.

3.1 The Model

In macroeconomic theory you usually try to explain changes in the aggregates quantity in the economy, like consumption, investment and domestic product. In this paper I will try to make the model as comprehensible as possible and therefore I will use some assumptions. First, we have two countries; China (C) and the rest of the world (R), where the rest of the world could be thought of as the home country. Second; the countries produces non-homogenous goods. Consumers in both of the countries buy the goods from each country and the price is determined by the world supply and demand. The share of each good in the economies is determined by its relative prices. Third, there is a single global currency but the two countries have its own monetary authority. We assume a fixed exchange rate, for simplicity set it to 1. Fourth; there is an exogenous increase in the Chinese productivity. China is therefore supplying the world with more goods. The fifth assumption is made because I assume a short time period where there is a supply shock. From a Keynesian view an assumption like this can be justified on a short term basis. I will use this model to focus on the effect of having more supply/ export. What will happen to the inflation rate?

Demand for goods:

For both countries I assume that the quantity theory of money applies:

$$M*V= (P*Y)$$

The demand for money is determinant of the flow of spending. P*Y represent the total nominal flow of spending, while the parameter V is the velocity of money which measure how fast money moves through the economy. I write this equation as:

$$M*V= E$$

where E is the nominal expenses on goods. I assume the parameter V is a constant and equal to 1, so that in the equilibrium the nominal expenditure is equal to the money supply in the country:

1. $E_C = M_C$
2. $E_R = M_R$

where E_i = nominal expenditures in country i (C,R) and M_i =nominal money supply in country i (C,R).

For algebraic convenience later on, I assume that the share of expenditure is identical for both of the goods and also in both of the countries, C and R. The demand for the Chinese goods is the same in China and in Non-China:

3. $P^C D^C_C = \delta E_C = \delta M_C$
4. $P^C D^C_R = \delta E_R = \delta M_R$

The demand for the Non-Chinese good is identical in China and in Non-China:

5. $P^R D^R_C = (1- \delta) E_C = (1- \delta) M_C$
6. $P^R D^R_R = (1- \delta) E_R = (1- \delta) M_R$

where P^i is the price of goods produced by country i (C,R) and D^i_j is the demand by country j (C,R) for the good of country i= C,R. While δ is the share of expenditures spent on goods from China. The share of each good in those expenditures is determined by the Chinese and the rest-of-the-world relative price, i.e. the price of the foreign goods compared to the domestic goods.

7. $\delta = f(P^C / P^R)$, $f`(\,) < 0$

Since I have already assumed that the share of expenditure is identical for both of the goods and also in both of the countries, the law of one price has to be considered as applicable. The law of one price tells that the expense of buying a good is the same in both countries (Vårdal 1994). The exchange rate is assumed to be equal to 1 and we get:

8. $P^R = e * P^C \Rightarrow P^R = P^C$

Supply of goods:

Each countries supply S is dependent on two factors; an exogenous production factor like capital, technology that represent technology S* and the relative price of the two goods. These equations are derived in appendix 1. First I have China:

$$9. \quad S^C = S^C \left(\left(\frac{P^C}{P^R} \right)^{(1-\delta)}, S^{C*} \right)$$

The supply functions properties are:

$$10. \quad \partial S^C / \partial \left(\frac{P^C}{P^R} \right)^{(1-\delta)} > 0, \quad \partial S^C / S^{C*} > 0$$

Second; the rest-of-the-world:

$$11. \quad S^R = S^R \left(\left(\frac{P^C}{P^R} \right)^{\delta}, S^{R*} \right)$$

$$12. \quad \partial S^R / \partial \left(\frac{P^C}{P^R} \right)^{\delta} < 0, \quad \partial S^R / S^{R*} > 0$$

It seems somewhat confusing that the first argument (relative price) in these supply functions is raised to either *(1-δ)* or *δ*. However, this is done for expositional ease, utilized in Appendix 2.

A rational argument for the first channel, i.e. the relative price term, can at first seem complicated. A practical example will help clarify the importance of this channel: higher Chinese prices will raise the costs of living in the "rest of the world" and consequently bring an upward pressure on the "rest of the world" wages, given the assumption that labour supplies are positively related to real consumption wages and there are full-employed labour markets in both countries. In absence of the ability to adjust the product prices of R goods, this type of "wage pressure" would be an indicator that would lower the supply of R goods, S^R. The higher share of consumption spent on Chinese goods (δ), the greater this effect will be. Analogues considerations hold for the supply Chinese goods, S^C.

However, the explanation of the second channel, i.e. the productivity parameter, is straight forward. When everything else is equal, a rise in Chinese productivity will increase the supply of goods and lower its price. How the non-Chinese products are affected by this depends on the elasticity of supply and demand. The price of the non-Chinese goods may rise or fall.

Goods market equilibrium:

In order to get market equilibrium the supply should be equal the demand. Hence, the supply of a Chinese and the non-Chinese goods should be equal their respective demand.

$$13.\ P^C S^C = P^C D_C^C + P^C D_R^C = \delta M_C + \delta M_R = \delta (M_C + M_R)$$

$$14.\ P^R S^R = P^R D_C^R + P^R D_R^R = (1-\delta) M_C + (1-\delta) M_R = (1-\delta)(M_C + M_R)$$

$$15.\ \frac{P^C}{P^R} = \frac{S^R}{S^C} \frac{\delta}{1-\delta}$$

In the model the countries expenditures are solved by its respective money supply and the share of each good in the economies are determined by its relative prices. Since the model has only one exchange rate and the law of one price is valid it means that the money supply in both China and non-China is given. Because the money supply in both China and non-China is given it determines the outcomes for the two goods prices. Equations (16.) show that an increase in the Chinese supply will lead to a decrease in the relative prices. The size of the decrease will be proportional to the share δ.

3.1.1 The effect of an increase the supply of goods

Using the derived model I will consider the case of a positive supply shock to Chinese productivity S^{C*}. First I consider the global consumer price index P which depends on the prices of both types of goods in the model[13]. The supply shock effects the prices of the goods, but the money supply is unaffected. Since the demand for Chinese goods is the same as the other countries goods in China and the other, the level of expenditure is the same, the consumer price index is also the same:

[13] The calculations for index P is derived in Appendix 2

16. $P = (P^{C})^{\delta} (P^{R})^{(1-\delta)}$

Derivation based on equation 20 and appendix 2 gives me:

17. $\% \Delta P = -\delta (\eta_{S,S^{C*}})(\% \Delta S^{C^*})$

Where $\% \Delta P$ denotes percentage change in consumer prices, δ = the share if Chinese goods in total expenditure, $\eta_{S,S^{C*}}$ =Chinese supply elasticity with respect to productivity and $\% \Delta S^{C^*}$ = percentage change in Chinese productivity. This equation shows how the global consumer prices react to an increase in the Chinese productivity. Since we have a global money supply and a constant demand, an increase in the Chinese production will lead to lower global prices. The decrease in price will be by the same proportion as the increase in supply.

How the global supply market react to a Chinese supply shock depends on the size of the Chinese share in the global economy. If Chinese share in global consumption is approximately similar to its share in world trade; 6.4 percent[14], it will probably have a limited affect on global prices. Since a rise in Chinese productivity depends on the share of the Chinese goods in global consumption, China has to stand for a significant part of the consummation goods.

Assume that the elasticity of Chinese supply with respect to Chinese productivity growth is equal to unity, the productivity parameter is 9.6 percent and as mention earlier; the Chinese share in world trade is 6.4 percent[15]. This gives us:

18. $\% \Delta P$ = -0,064*100*0,096= -0.61

This equation implies that the growth in China has a negative effect on the global inflation with a 0.61 percent a year.

This equation implies that Chinese productivity growth has been lowering the consumer price inflation. The question is if it has enough impact to raise concerns about the inflation

[14] Key figures from 2005 taken from Greene (2006)
[15] Key figures taken from Greene (2006).

development. Even if Chinas share in global consumption is relatively small, the threat of being able to supply more goods at a lower price than its competitors may restrain the prices of goods produced outside China. However, this is only reliable if China has huge amounts of excess capacity, so that is can raise its production and thereby also the marked share to a sufficient level that may lower global prices as shown in equation 18. Nevertheless, the result in equation 18 is dependent on the assumption that money supplies remain constant. In reality the central banks would be able to offset some of this effect by loosing its monetary policy from the central banks.

3.1.2 The separate effect on the prices of China and non-China

Additionally, you can get the separate impact of a Chinese supply on the prices of China and the "rest of the world" goods:

$$19.\ \%\Delta P^{C} = -\frac{1-\delta+\delta((1-\delta)\eta_S-\eta_d)}{1-\delta+(1-\delta)\eta_S-\eta_d}(\eta_{S,S^{C*}})(\%\Delta S^{C*})$$

$$20.\ \%\Delta P^{R} = -\frac{\delta((1-\delta)\eta_S-\eta_d)}{1-\delta+(1-\delta)\eta_S-\eta_d}(\eta_{S,S^{C*}})(\%\Delta S^{C*})$$

The first part of the equation illustrate that higher Chinese productivity and a reduction in Chinese prices directly lowers CPI`s in China and non-China. Consider a case where the supply curves in China and the other country do not respond to relative prices, as a result $\eta_S=0$, and the expenditure share is unresponsible to relative prices as well, consequently $\eta_d=0$[16]. This case corresponds with unit price elasticities of demand for Chinese and "the-rest-of-the-world" goods which mean that movement in the prices are exactly offsetting a change in demanded quantities. In that case equation 20 and 21 can be re-written like:

$$22a.\ \%\Delta P^{C} = -\frac{1-\delta}{1-\delta}(\eta_{S,S^{C*}})(\%\Delta S^{C*}) = -(\eta_{S,S^{C*}})(\%\Delta S^{C*})$$

$$23a.\ \%\Delta P^{R} = -\frac{0}{1-\delta}(\eta_{S,S^{C*}})(\%\Delta S^{C*}) = 0$$

[16] Note: η_S is the elasticity of Chinese supply with respect to relative prices P^C/P^R and η_d is the elasticity of the share δ with respect to relative prices P^C/P^R (see appendix 1).

The outcome of this severe case is that the supply and the demand for goods produced outside China is unaffected by the rise in Chinese production, so that the price of non-China goods remains unchanged. In consequence, the prices of Chinese goods fall by the exact amount that production rises, and the fall in global prices specified in equation 18 results exclusively from the decline in the price of the Chinese goods in CPI.

The second part of the equation illustrate that lower Chinese prices reduce global prices by lowering production cost in "the-rest-of-the world". Also this case has some restrictions however here the supplies of goods are allowed to respond to relative prices, as a result $\eta_S > 0$ but the expenditure shares does still not response to relative prices, consequently $\eta_d = 0$:

22b. $\% \Delta P^C = - \dfrac{1-\delta+\delta((1-\delta)\eta_S}{1-\delta+(1-\delta)\eta_S}(\eta_{S,S^{C*}})(\% \Delta S^{C*})$

23b. $\% \Delta P^R = - \dfrac{\delta(1-\delta)\eta_S}{1-\delta+(1-\delta)\eta_S}(\eta_{S,S^{C*}})(\% \Delta S^{C*})$

In this case I see that the increase in Chinese production leads to smaller decline in the prices of the Chinese goods and some decline in the non-China price compared to latter case. Anyhow, this decline in prices does not affect the activity on the part of non-Chinese producers. This decline in non-China prices also reduce the cost of living in non-China, which leads to lower *nominal* wage and allows the non-China producers to sell more of their goods at lower prices.

In the last example I consider a case where supplies do not respond to relative prices, therefore $\eta_S = 0$, on the other hand the shares of expenditures are allowed to respond to relative prices, this result in $\eta_d \neq 0$:

22c. $\% \Delta P^C = - \dfrac{(1-\delta)-\delta\eta_d}{(1-\delta)-\eta_d}(\eta_{S,S^{C*}})(\% \Delta S^{C*})$

23c. $\% \Delta P^R = \dfrac{\delta\eta_d}{(1-\delta)-\eta_d}(\eta_{S,S^{C*}})(\% \Delta S^{C*})$

This scenario has two cases. First; reductions in Chinese prices will cause declines in the share of expenditure devoted to Chinese goods, consequently $\eta_d > 0$. This means that the Chinese and the non-Chinese goods are not very substitutable and the price elasticity of demand for Chinese goods are relatively inelastic. Since the goods are not very substitutable this decline in Chinese prices could actually increase the prices of the non-China goods, this is indicated in equation 23c. A reduced share of expenditure on Chinese goods result in higher share devoted to non-Chinese goods, and higher demand gives incentives for higher prices in the latter category. Second; I have a case where the Chinese and the-rest-of-the-worlds goods are very substitutable with each other and the price elasticity of demand for Chinese goods exceeds one. I therefore have a case where a reduction in Chinese prices will cause increases in the share of expenditure devoted to Chinese goods, so it result in $\eta_d < 0$. Under these circumstances the price of the rest-of-the-world goods decline, though not as much as the price of Chinese goods, as it corresponds to the increased competition from Chinese low-priced goods.

3.2 Summary of the Model

The model highlights three channels how Chinese production growth and lower export prices can be capable of lower non-Chinese consumer prices. First; cheaper goods from China have a direct effect on non-Chinese CPI, i.e. a decrease in CPI. Second; it effect the for demand non-Chinese goods. Third; an effect on the prices on non-Chinese goods. These effects are working through the decrease in the demand for non-Chinese goods as a consequence of cheaper Chinese goods. Cheaper goods from China give the demander incentives to switch the demand from non-Chinese goods to Chinese goods. A switch like this will reduce the market share for non-Chinese producers. This is called the substitution effect which depends on the elasticity effects. “A price elasticity of demand are the percentage change in the quantity of goods demanded that results from a 1 percent change in its price
(Frank 2003)p 121”. This means that if demand for Chinese goods is highly elastic, a decrease in Chinese prices will reduce the share of income spent on foreign products. However, if demand for Chinese goods is highly inelastic, a decrease in Chinese prices might reduce expenditures on imports from China and instead raise the expenditures on domestic goods. Third; the low-cost import puts pressure on non-Chinese producers to lower their prices. Lower CPI depress nominal wages, this means lower production cost (indirect effect).

The size of this effect seems to be positively related to the power of Chinese competition (Globalisation OECD).

3.3 Other aspect with the model

While this model is well-suited to highlight some of the most general effect from an increase in the Chinese production there are some aspects of this effect that misses out in the model. In reality the world trade is much more complex. There are many suppliers that offer assorted goods at different prices. I can express these channels in these equations where P_i is the import price paid by Norwegian importers for good i, P_i^C is the weighted average price of import goods i from China, and the import prices of goods i from the rest of the world (excluded Norway) is P_i^R, then the total Norwegian import weights are divided between the import from China and the rest of the world (Kamin 2006).

21. $P_i = \delta_i^C * P_i^C + \delta_i^R * P_i^R$

$$= \delta_i^C * P_i^C + (1- \delta_i^C) P_i^R$$

From this I see that an increase in the import share from China will decrease the import share from the rest of the world. If I differentiate and express the equation in percentage change I get:

22. $\% \Delta P_i = (\% \Delta P_i^R (P_i^R / P_i)) + (\Delta \delta_i^C ((P_i^C - P_i^R) / P_i))$
$+ (\delta_i^C (\% \Delta P_i^C (P_i^C / P_i) - \% \Delta P_i^R (P_i^R / P_i))).$

This equation highlights some channels how an increase in Chinese supply may weight on the Norwegian import prices. The first part of the equation highlights that because of Chinese competition there could be a possibility of a weaker growth in Norwegian prices and as of this a reduction in the import price inflation. The second part shows if the Chinese goods are cheaper than the other goods, the Chinese goods will stand for a higher share of the import value and reduce the average price of Norwegian import prices. If this is the case there will be incentives for the rest of the world's monetary authority to decrease the prices of their good. The third part highlight a situation where the import share from China is constant but import prices from China are declining more than goods from other countries. Although this is the case it still has a restraining effect on the Norwegian import prices.

However it is important to now that this equation is a useful framework for non-homogenous goods and not homogeneous goods. For non-homogenous goods persons preferences, brand loyalty and its interpretation of a product, quality differences and product characteristics, influence its choice of goods. Those characteristics effect who the country import from, but also makes sure that there are always someone that wants to buy the product. To base my thesis on a model that particularly focus on non-homogenous goods makes sense because most part of China's export endure of lightly manufactured goods and they all have its own characteristics that likely will lead to changes in measured import prices.

Chapter 4: Data and Methodology

Quantitative methods will be used in this master thesis. This chapter will introduce data that was used for this thesis and specify the regression strategy. In sections 4.1 to 4.3, the dataset will be discussed and section 4. 4 explains the empirical strategy.

4.1 Presentation of the dataset

The purpose of my thesis is to determine whether the low-priced import from China has had a negative impact on Norwegian inflation. To see if any connections between import rate from China and the inflation rate in Norway exist, I have chosen the period from 1980 to 2005, a 26 year time period, to further research. The constructed data set for this thesis paper is based mostly on data from the Statistics of Norway, along with some calculations I made for this thesis.

The extent to which China is responsible for the declining tendency in Norwegian import inflation, is difficult to say, as import prices are not available by sector level. Because of this, data on import from China had to be treated with unit of a value perspective. These data were obtained from the Statistics of Norway where the total amount of import from China is disaggregated by end use sector, e.g. clothes, shoes, or consumer electronics.

4.1.1 Choice of product groups and other independent variables

The analysis on this thesis is based on ten carefully picked product groups. First, groups that had experienced large increase in the import share volume to Norway were selected for analysis. Then a wide range of different goods was chosen from the product groups I wished to look at. The following table is a brief summary of the ten sector variables that are included in the analysis:

Table 4.1: Presentation of the variables

Variable name	Interpretation
group 1	Dummy variable equal 1 if the variable is office supply and computer equipments imported from China
group 2	Dummy variable equal 1 if the variable is clothes and accessories imported from China
group 3	Dummy variable equal 1 if the variable is telecommunication equipments imported from China
group 4	Dummy variable equal 1 if the variable is furniture imported from China
group 5	Dummy variable equal 1 if the variable is vehicle for roads…. imported from China
group 6	Dummy variable equal 1 if the variable is travel goods, purses e.g. imported from China
group 7	Dummy variable equal 1 if the variable is shoes imported from China
group 8	Dummy variable equal 1 if the variable is goods made of wood and cork imported from China
group 9	Dummy variable equal 1 if the variable is different manufactured goods imported from China
group 10	Dummy variable equal 1 if the variable is scientific and technical instruments imported from China

The following table shows a tremendous increase in the import of goods produced in China.

Table 4.2: Development in the import shares from China[17]

Variable	1980-share	1992-share	2005-share
1: Office supply and computer equipments imported from China	0.00003	0.003	0.180
2: Clothes and accessories imported from China	0.008	0.117	0.364
3: Telecommunication equipments imported from China	0.00001	0.017	0.168
4: Furniture imported from China	0.003	0.007	0.077
5: Vehicle for roads imported from China	0.00004	0.003	0.007
6: Travel goods. purses e.g. imported from China	0.015	0.448	0.503
7: Shoes imported from China	0.004	0.066	0.271
8: Goods made of wood and cork imported from China	0.0008	0.013	0.035
9: Different manufactured goods imported from China	0.004	0.032	0.110
10: Scientific and technical instruments imported from China	0.00002	0.003	0.023

Note: How much of the sector group that is imported from China given the total import in each sector.

[17] For a graphical presentation see Appendix 3

This table shows that there has been a huge increase in these product groups[18]. Noticeable, group 6 is in charge of 50 percent of the total import to Norway in 2005, within its product group.

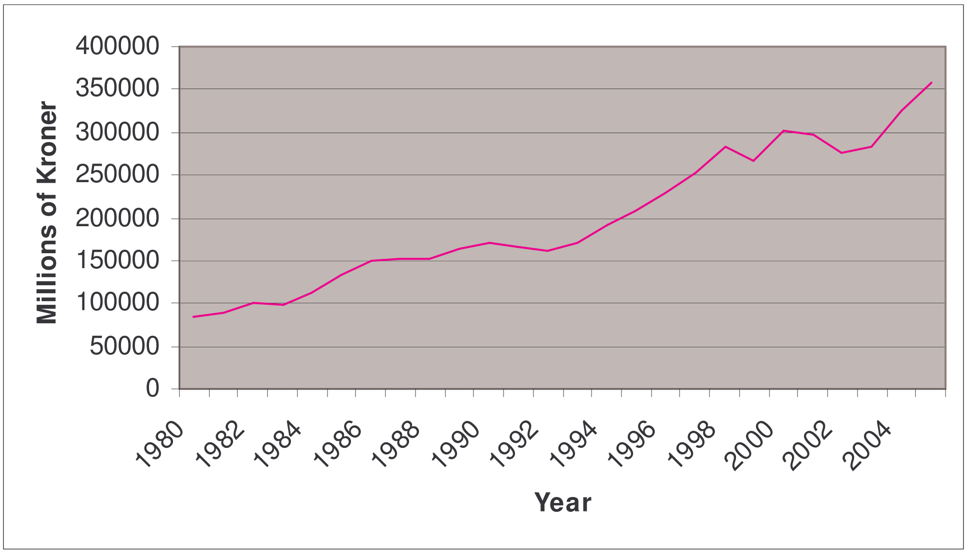
The import ratio is calculated as the ratio of a country's imports from China to its total imports. The Chinese import ratio in the time period from 1980 to 2005 has a mean value of 1.84 percent level, a minimum level of 0.49 percent, and a maximum level of 5.61 percent. To calculate the import shares for each sector, annual Norwegian import values are obtained from data collected by the Statistic of Norway. This variable is called *ChinaPGofTot* and it demonstrates the amount of total import at sector level from Chinese import at sector level, i.e., "Import from China, at sector level" divided by the "total import in Norway, at a specific year, t, and sector, i. Together these 10 product groups have an average sector share of 7.6 percent with a minimum- and maximum-levels at 0.0004 percent and 55.9 percent, respectively.

4.1.2 The dependent variable

The dependent variable in this thesis is the total import to Norway at sector level. These groups are extracted from the total import level to Norway. It is then useful to look at the development in the total import level in Norway. From the following graph it can be seen that the import level in Norway has had a tendency to increase at a relatively smooth pace.

[18] Graphical presentation of this is in Appendix 3.

Figure 4.1: Total import in Norway



Source: ssb.no

In the time period from 1980 to 2005 the minimum level of Norway's import was 83,600 million, which occurred in 1980. The maximum level of Norway's imported goods was 358,000 million in 2005. This results in an average import level in Norway of 200,000 million.

To obtain panel data, dependent variables that are "connected" with the independent variables must be used. Therefore, the total import level for the ten groups described earlier was used. The sector variables at the total level of import were used as the dependent variables and the sector variables with values only from China were then the independent variables. When looking at these ten product groups combined, the mean value was 5,610 million, the minimum was 166 million, and its maximum was 37,100 million. The minimum and maximum values occur in group 6, travel goods and purses, and group 5, road vehicles, respectively.

Furthermore, some alternative specifications with the same dataset have been made. Average kilogram (kg) prices for each product group have been calculated. These are found by dividing the total import value for each product group by its total weight. These data are as close to the real price indexes as could be obtained. It will be interesting to see if the different data sets will give comparable results.

The consumer price index (CPI) will be used as a dependent variable in addition to the two previously mentioned dataset specifications. The price level is generally measured in units of the CPI. Therefore changes in inflation will basically be observed through data from the consumer price index. The consumer price index is designed to measure the cost to purchase a fixed basket of goods and services representing average consumption patterns during some base period (Moulton 1996). The long time CPI is determined by the price of foreign goods (P*) and the money supply (M). The Statistics of Norway calculate and public CPI each month based on the Laspeyres price index. The yearly CPI is based on the short- term indexes and transformed into an aggregated index with a basis year of 1998. The purpose of this is to measure the actual price increase for goods and services. The estimation of the CPI is based on a spread of 900 goods over 8 groups. To calculate the CPI, all goods are put into groups with each group having some share of weight on the resulting CPI. The weight foundation for the CPI is founded on the average consumption expenditure per household. This also includes purchases that are made abroad. The weight computation is based on expenses in the last 3 years and the CPI is divided into 3 groups[19]. First; CPI-JE: the index does not count for energy goods otherwise its identical with CPI. Second; CPI-JA: adjusted for changes in taxation. Third; CPI-JAE: this is the CPI which the Norwegian Bank is using for measuring the inflation process. This is adjusted for both changes in taxation and energy goods. CPI-JAE is based on CPI-JA and CPI-JAE. In my thesis I will use the same CPI as the Norwegian Bank uses to measure the inflation process, i.e. CPI-JAE.

4.2 Estimation of value

The denominations of the import values are expressed in the Norwegian Kroner (NOK). The import values are C.i.f. (Cost Insurance Freight)[20], meaning that, in principle, the transaction costs are “included” in the import values.

The foreign trade statistics main classification is the SITC (Standard International Trade Classification) which is an international classification system based on external trade. It is designed to make trade goods from each country more comparable to each other[21]. There are different types of SITC, but only SITC Rev.2 has data available since 1980. The system shows import by section and division of the SITC. In the SITC Revised 2, there are 2,582

[19] Description of the CPI is based on material from Statistics of Norway.
[20] Ssb.no
[21] http://stats.oecd.org/glossary/detail.asp?ID=2466

various groups with the total trade divided into ten categories. As mentioned earlier, the regressions in this thesis are based on ten product groups.

The data sample in this thesis is taken from the time period of 1980 to 2005. During this time period there have been changes in the estimation of the CPI. In august 1999, there has been a change in method, from arithmetic to a geometric calculation, on the microeconomic levels index. At the same time, there was a change in basis year, from 1979 to 1989, and a new consumer clustering, COICOP (Classification of individual consumption by purpose), a consumer classification system made by the United Nations. In the period from 1979 to 1989 there has been considerable price inflation and the change in basis year yielded a lower levelled index series. This means that there are only numbers with one decimal place. This will not systematically affect the index values but difference in the numbers from the old and the new index series can occur. The series with reference year 1970 are the official CPI until June 1999. Then, the official CPI will have 1998 as the reference year[22], which is also the reference year used for the data set in this thesis. It is obvious that during the last couple of years there have been some changes the way to calculate CPI. Even so, in this paper, data from the Statistics of Norway are considered as reliable and important.

4.3 Considerations regarding the dataset

The data I got from Statistic of Norway is considered reliable. However there are some aspects with the data that should be discussed. One problem with the data is that they are not adjusted for differences in quality. This means that a good from China may be less expensive, but if we are adjusting for quality differences the relative prices would be the same. However, this effect could also go the opposite way, which means that Chinese goods could be even cheaper after adjusting for quality differences. Anyhow, the data should at least be indicative of movements in trade prices. Second, as the import prices are valued in CiF[23]. This means that the value of imported goods is inclusive transportation-and-insurance-cost, getting from the exporting county till the importing country. In this case the transportation cost is relatively lower from Europe than China, which can make Chinese good appear more expansive than they actually are. Third, in this paper there will be no distinguishing between import prices, output prices and consumer prices. However such distinguishing is likely to be important. The

[22] http://www.ssb.no/emner/08/02/10/nos_c680/nos_c680.pdf
[23] http://www.ssb.no/emner/09/01/begreper/

import prices are measured in Norwegian kroner. They will therefore not show any of the foreign inflationary impulse.

4.4 Empirical strategy

Here, the strategy for regression models used in thesis will be explained. Subsection 4.4.1 will show a brief summary of possible regression models in an ideal situation and 4.4.2 will describe actual situation.

4.4.1 Ideal situation

If data on inflation at sector levels, e.g. CPI, were available I would analyze whether the sectors that experiencing the largest increase on the share of purchases from China are those that are experiencing the greatest decline in import prices. In theory, the groups of goods that are experiencing particularly rising import shares should also be experiencing low rates of price inflation. Applying a regression to this would result in negative correlations between import price inflation and the change in shares of import purchased from China. To test this hypothesis the following equation is used,

To test this hypothesis I estimate this equation;

1. $\% P^{C}_{t,i} = \beta_0 + \beta_1 * \Delta \delta^{C}_{t,i} + \beta_2 * \delta^{C}_{t-n,i} + u_{it}$

where $\% P^{C}_{i,t}$ is the change in the price of Norwegian import in sector it in year t, change in import from China, and initial weight of Chinese share of the import. This equation represents a cross-sectional regression equation. For each end-use import sector, changes in the share for the same end-sector year are compared to the initial level of the Chinese share, over a selected period from t-n to t. Parameters in this equation reflect different channels through which an increase in Chinese supply may affect Norwegian import prices[24]. The parameter β_1 is the most likely value to be negative.

If calculations from the latter equation should be interpreted as summarizing associations in the data between shares of Chinese imports and the Norwegian consumer prices, these associations could be misleading and unauthentic. Due to globalization and changes in market structure there is increased competition in certain sectors that give incentive to reduce prices and induce producers to source their products to a low-wage country, i.e. China. In this

[24] These considerations are derived in equation 17

case, both $\% P^{C}_{i,t}$ and $\Delta\, \delta^{C}_{i,t}$ would be correlates with a third variable that can lead to a more negative coefficient on $\Delta\, \delta^{C}_{i,t}$ than that which would be implied by the sole actual effect of Chinese exports on Norwegian import prices. To address this concern, another independent variable is added to equation 1, a lagged consumer price variable:

2. $\% P^{C}_{t,i} = \beta_0 + \beta_1 * \Delta\, \delta^{C}_{t,i} + \beta_2 * \delta^{C}_{t-n,i} + \beta_3\, \Delta P_{t-n,i} + u_{it}$

The lagged variable is designed to control other factors that tend to lower inflation in a particular sector such that the coefficient on $\Delta\, \delta^{C}_{i,t}$ is the genuine impact of additional imports from China on import prices in that sector. It is possible that declines in Chinese export prices could cause significant declines in the export prices of other countries so that the shares of Norwegian import remain unchanged. On the other hand, China could depress Norwegian import prices without any change in Chinese import shares. This will result in an underestimated coefficient for the Chinese export, causing the impact of imported low-price goods from China to be larger than estimated in equation (2). However, the last scenario appears to be most likely when dealing with homogenous goods, such as oil, and not with differentiated manufactures that China tends to export.

4.4.2 Actual situation

Since the scenario described above is not the actual case, alternative data must be used. Here, I start by using "volume" data, then by using the "kg-price"-data:

3. $\text{LogTotImPG}_{it} = \beta_0 + \beta_1 \text{logimpratio}_{it} + u_{it}$

and the following alternative regression:

4. $\text{LogPriceTotal}_{it} = \beta_0 + \beta_1 \text{logimpratio}_{it} + u_{it}$

where the *it* subscript stand for the *i*th country's observation value at time *t* for the particular variable, u_i is a error term, which include unobserved factors that are not considered in the regression. *LogTotImPG* is the logarithmic value of the total import in Norway, at sector level. *Logimpratio* is the logarithmic value of the import ratio at sector level. It is assumed that there will be a negative correlation between the dependent variable (decreases) and the level change shares of imports purchases from China (increases). Due to low-cost imported goods, the dependent variable is more sensitive to level of import from China.

Additionally, I would like to get a sense of the impact of Chinese export on Norwegian import, on a sector level. If Chinese export volumes increases more rapidly than of those other Norwegian trading partners, goods with a particular high share of imports from China should have a larger effect on the unit of value level of the total import (*LogTotImPG*) than others. We can also assess whether sectors that experience the largest increase on the share of purchases from China are those that are experiencing the greatest decline in import prices. This means that China has decreasing effect on the total import price level (*LogPriceTotal*).

5. $\text{LogTotImPG}_{it} = \beta_0 + \beta_1 * \Delta \delta^{C}_{t,i} + \beta_2 * \delta^{C}_{t-n,i} + u_{it}$
6. $\text{LogPriceTotal}_{it} = \beta_0 + \beta_1 * \Delta \delta^{C}_{t,i} + \beta_2 * \delta^{C}_{t-n,i} + u_{it}$

Since data on inflation, at sector level, are not available I therefore calculate a time series regression with the CPI as the dependent variable, to determine whether the size of China's shares play a vigorous role on the inflation level. The dependent variable is then the logarithmic value of the CPI and the independent variable is the logarithmic value of the import ratio from China:

7. $\text{LogCPI}_{t} = \beta_0 + \beta_1 \text{logChinaShare}_{t} + u_{t}$

Chapter 5: Empirical specification

The purpose of econometric analysis is to analyse different models parameters and to test different hypothesis given these parameters. Different types of data are used to explain the different effects one is interested in. First one has to decide what kind of data that will illustrate the purpose of the thesis best. Next, one have to decide what sort of estimation method that will give the best parameters.

For this thesis I have constructed a panel data set and this is the basis for my econometric analysis. In part 4.2, I describe the basis of the Ordinary Least Square method. Then in 4.1.4.3 and 4.4 a give a presentation of the panel data, while in 4.5 I choose the best model based on the Hausman-Taylor-test. This chapter is based on Wooldridge (Wooldridge 2003) and Stock and Watson (Stock 2007).

5.1 Panel Data

Panel data, also referred to as longitudinal data, are data that consist of observations on the same n entities observed at T different time periods. The data I present for my thesis consist of 10 different product groups (m), where each entity is observed in T= 26 time periods, this makes total observations of 10* 26= 260. When describing panel data I was to required to keep track of the entities and the time period. There are several of advantages by using panel data. By observing both time- and micro level data there is an increase in observations. By observing both time and micro level data there is an increase in possible number of observations. When following the same variables over time, the opportunity to identify economic changes, that are not as noticeable if only time series or cross-sectional data are used, is possible. Another significant advantage by using panel data is that it is possible to control for unobservable factors. By using the Fixed Effect-model it is possible to eliminate the effect of omitted variables that differs across entities but are constant over time if you are studying changes in the dependent variable over time[25]. The equation I employed, that consist of Chinese import shares and US import prices, represent a reduced-form relationship.

However, this relation could be misleading do to over evaluation of the downward pressure from Chinese low-priced goods. A side effect of this change in market structure and globalization is that the importing country is reducing its prices to compete with the goods

[25] Stock and Watson (2007)

produced via a low-wage country. Since I cannot be granted access to these variables, there will be some unobservable variables in my dataset, influencing my results.

In practise there are some disadvantages by using panel data models. Outliers can bias regression slopes, especially if the outliers vary by a great amount compared to other variables, giving them a large amount of negative leverage. The fixed effects models may frequently have too many cross-sectional units of observation. These observations may require too many dummy variables for their specification and the effect from this may sap the model of sufficient number of degree of freedom for the satisfactorily statistical tests. A consequence for such models will be multicollinarity. If these models contain variables that do not vary within the groups, the estimators will possibly be irrelevant. Often parameters are known to be biased in models with fixed effects and lagged dependent variables. The homogeneity assumptions are often given the coefficients of the lagged dependent variable which can lead to serious biases when, in fact, these parameters are heterogeneous across cross- sectional units. Although the model residuals seem to be normally distributed and homogenous, there could easily be a group wise heteroskedasticity or autocorrelation in the model that would further restrain the estimation, causing an efficiency problem. [26]

5.2.1 Ordinary Least Squares Model

Since I will do some regressions in my thesis, it is useful to go through some basic assumption and theory for the Ordinary Least Squares (OLS) method. If data for the different product groups were not available it would be natural to use this type of regression. Then, the following describes the OLS model:

1. $y_{it} = \beta_0 + \beta_1 x_{it} + u_{it}$;

where y_{it} is the dependent variable which I am describing with the independent variable x_{it}, u_{it} is the stochastic errors term that fulfil all the classical OLS assumptions. The error term includes all the variables that are significant for the model but are not included in the model. The i and t is the respectively entities and time. The beta parameters. β_0 and β_1 are the parameters that should be estimated. They measure the causal effect x_{it} has on y_{it}. The estimators of the intercept and slope that minimize the sum of squared are called the ordinary

[26] Yaffee(2003)

least squares estimators of β_0 and β_1. The β_0 is the intercept and β_1 is the slope of the population regression line.

For the estimator to be unbiased and consistent the classical OLS- assumption have to he satisfied. If this is true the estimator is BLUE; Best linear unbiased estimator. In other words the OLS estimator has the smallest variance among all estimators in the class of linear conditionally unbiased estimators and the OLS-estimator is the same as the true value β_1 = $\hat{\beta}_{OLS}$. To include an irrelevant estimator in the model will make the model inefficient but it will not make the estimator biased. However, not including a relevant variable in the model will result in a biased estimator.

The OLS- estimator is:

2. $\hat{\beta}_{OLS} = \sum_{i=1}^{n} (x_{it} - \bar{x}_t)(y_{it} - \bar{y}_t) / \sum_{i=1}^{n} (x_{it} - \bar{x}_t)^2$ Notice that $\sum_{i=1}^{n} (x_{it} - \bar{x}_t)^2 \geq 0$.

Where $\bar{x}$ er the Total Average and $\bar{x}_i$ is the Average within the group i. expressed like:

3. $\bar{x} = \frac{\sum_{i=1}^{n}\sum_{t=1}^{T} x_{it}}{n * T}$

4. $\bar{x}_i = \frac{\sum_{t=1}^{T} x_{it}}{T}$

The same is true for y_{it}.

While dealing with panel data you often have to estimate individual heterogeneity. This means that the intercept estimator is dependent on the individual/ group. while the slope estimator is the same for all individuals/groups:

5. $y_{it} = \beta_0 + \beta_1 x_{it} + u_{it}$

If this equation is the result of the true model it means that the equation model (1.) is biased. The heterogeneity is not taken into consideration. The most used regression models that consider the heterogeneity is the Fixed effect model (FE) and the Random effect model (RE).

5.2.2 Fixed Effect Model

Fixed regression is one of the main tools for regression analyses of panel data. This is an extended method of multiple regression that exploit panel data to control for variables that differs across entities but constant over time. Particularly, the fixed effect method is good for controlling for omitted variables in panel data when the omitted variables vary across entities but do not change over time.

Fixed effect model:

6. $y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 Z_i + u_{it}$

where Zi is the unobservable variable that varies from one state to the next but does not change over time. Because of this it can be interpreted as having n intercept. one for each state. Categorically, let $\alpha_i = \beta_0 + \beta_2 Z_i$. Then the equation becomes

7. $y_{it} = \beta_1 x_{it} + \alpha_i + u_{it}$

The fixed effects regression model have the intercept α_i which are treated as unknown intercepts to be estimated one for each state (unobserved heterogeneity). To eliminate the α_i we have to subtract the mean of the variables:

8. $(y_{it} - \bar{y}_i) = (x_{it} - \bar{x}_i)\beta + (\varepsilon_{it} - \bar{\varepsilon}_i)$

Since the α_i is constant over time the mean also be α_i and therefore disappear it disappears from the model. $\alpha_i - \alpha_i = 0$. From this transformations the constant variables vanishes from my model and this could for example be each of the product groups' initial level. The FE-estimator $\hat{\beta}_{FE}$ is made if one use the OLS estimator obtained on equation 5:

9. $\hat{\beta}_{FE} = \sum_{i=1}^{n} \sum_{i=1}^{T} \frac{(x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i)}{(x_{it} - \bar{x}_i)^2}$

The FE-estimator is unbiased and consistent estimator under the same assumption as the OLS-estimator.

5.2.3 Random Effect Model

In cases where the key variables do not vary much over time, the fixed effect methods can lead to imprecise estimates. Therefore one may be forced to use random effect (RE) estimation in order to gain knowledge about population parameters. The model allows for variables which are constant over time. The FE model treated the coefficient Z_i as fixed but unknown. However in the RE model the coefficients are treated as random drawing from a common population with a fixed mean, called θ:

10. $y_{it} = \beta_1 x_{it} + \alpha_i + u_{it}$. where $\alpha_i = \theta + \varepsilon_i$

11. $y_{it} = \beta_1 x_{it} + \theta + (u_{it} + \varepsilon_i) = \beta_1 x_{it} + \theta + v_{it}$

The error term v_{it} is divided into two parts. First; ε_i is a group specific error with an unobservable time-invariant random effect which is given the i-th cross-section group. This term is assumed to be independent of other group specific error terms and to have a zero mean and constant variance. The second part is u_{it} and it is the overall error in the model. The OLS estimator will in this case not work because the group specific error has a covariance that is different from zero (autocorrelation). This violet the OLS assumption, that the idiosyncratic error term is uncorrelated with the regressors at any time. To fulfil this assumption one has to transform the equation with a quasi-demeaned regression:

12. $(y_{it} - \lambda \bar{y}_i) = (x_{it} - \lambda \bar{x}_i)\beta + (\varepsilon_{it} - \lambda \bar{\varepsilon}_i)$ where $\lambda = 1 - \sqrt{\varphi} = 1 - \sqrt{\frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + T\sigma_\alpha^2}}$

13. $\hat{\beta}_{RE} = \sum_{i=1}^{n}\sum_{t=1}^{T} \frac{\sum_{i=1}^{n}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i) + \varphi T \sum_{i=1}^{n}(\bar{x}_i - \bar{x})(\bar{y}_i - \bar{y})}{\sum_{i=1}^{n}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)^2 + \varphi T \sum_{i=1}^{n}(\bar{x}_i - \bar{x})^2}$

There have to be independency between the regressors and the residual to fulfil the consistency requirements for the RE model; this is also true for the OLS model. In equation (1.) we assume that $E(x_{it} * u_{it}) = 0$. While in equation (11.) we assume that $E(x_{it} * v_{it}) = 0$. If this is true we can expect $E(x_{it} * \varepsilon_i) = 0$ and $E(x_{it} * \alpha_i) = 0$ to be true too. If not the RE-model is no longer a consistent model. There have to be independency between the regressors and the unobserved heterogeneity term; α_i.

5.3 Choice of Model

Every model has its advantages and disadvantages. However, the vital question is whether or not there is some unobserved individual heterogeneity that that needs to be taken into consideration and if there is an independency between the individual heterogeneity and the observed explanatory variable. The RE model is used when there is independency between the unobserved and observed variables which I have argued that is not likely for the data set in this paper, refer equation 2 in 4.4.1. Additionally, a RE-model assumes that the "individuals", or product groups, are randomly picked from a large sample. This is obviously not the case for the analysis in this paper. It is also noticeable that there are no fixed variables in the dataset. Based on these things, I have chosen the FE-model as my main regression method.

5.4 Multicollinearity in the dataset

Multicollinearity arises when there is correlation between the independent variables in the model. There are two types of multicollinarity; perfect-and-imperfect multicollinearity. Perfect multicollinearity arises when one of the regressors is a *perfect* linear combination of the other regressors while imperfect multicollinearity means that one of the regressors is *highly* correlated with the other regressors. Unlike perfect multicollinearity, imperfect multicollinearity does not prevent the estimation of the regressors. When a new x variable is added that is strongly related to current x variables in the model, there may a possibility that that one or more regression coefficients would be estimated imprecisely. Symptoms of possible trouble could be the following (Hamilton 2006):

1. Substantially higher standard errors and correspondingly lower t- statistics.
2. Unexpected changes in coefficient magnitudes or signs.
3. Non-significant coefficient despite a high R^2.

The collinearity problem is more common in relatively small samples or if the variables are too similar. It is possible that my data set have these characteristics since it contains a few variables and they are relatively alike. In my dataset there are independent variables that are correlated with each other. However, they are not perfect correlated and therefore not dropped from the model. Regardless, it is important that a closer look at some of the estimated coefficients be taken to determine whether some have different signs compared to the hypothesis in this thesis. By using the post-regression command **vif** (Variance inflation factor) it *"gives you a quick and straightforward check for multicollinarity"*[27] *(Hamilton 2006).*

5.5 Heteroskedasticity and Autocorrelation

To determine if my estimators were Blue, I needed to run some tests. Each model was tested for heteroskedasticity by using a Breusch-Pagan test and a Durbin- Watson test to test for autocorrelation[28]. The results are listed following the estimated coefficients below.

If there are heteroskedasticity in my regression model it means that the error terms variance will vary with each independent variable. Anyhow the estimators are still unbiased and consistent. There is no obvious reason to expect homoskedasticity heteroskedasticity but one cannot rule out the fact that it could happen. Homoskedasticity would mean that the variance of the error term does not vary with the product groups. A Breusch-Pagan test can give an indication if there are heteroskedasticity in the error terms or not, nonetheless it will not indicate what kind of heteroskedasticity we are dealing with.

Autocorrelation arises when an error term in one period influences the error term in a later time period. One of the panel data assumptions is no autocorrelation. If this is not the case and we have autocorrelation the estimators are no longer BLUE, however they are still unbiased and consistent. Possible causes for autocorrelation could be: (a) omitted variables that are relevant for the model, (b) impact of a shock in the economy, (c) deviant behaviour. (Wooldridge 2003)

[27] Hamilton (2006) , page 211
[28] See Wooldridge (2005) for a more thoroughgoing specification on Breusch-Pagan-and- Durbin-Watson- tests.

Chapter 6: Results from the Regression Models

In this chapter, I present the different regression results. In part 6.1- 6.1.3 I present the results of an FE-model estimated by an OLS- method and then I interpret my results. After this I test the validity of my results. In part 6.2.1-6.2.3 I do the same as in the previous parts, the difference is that I use an alternative specification of the variables that is in the data set.

6.1.1 Results of the FE-model estimated by OLS

Even though I have panel data, I choose here to use OLS as estimation method. However, by adding a dummy variable for each sector, 10 product groups, this will give me a FE-model estimates by OLS. The dataset contains a time perspective; however the OLS regression method does not take this into consideration and the time effect is therefore included in the error term. By making 26 dummy variables I get the time effect. Given this 26 more variables are added to the regression variables, group 1- group 26, where all of this variables equals 1 in given year, if not they equal 0.

The regression variable can be written:

1. $lnTotImPG = \beta_0 + \beta_1 ChinaPGofTotim + \beta_2 group1 + \beta_3 group2 + \beta_4 group4 + \beta_5 group5 + \beta_6 group6 + \beta_7 group7 + \beta_8 group8 + \beta_9 group9 + \beta_{10} group10 + \beta_{11} time1 + \beta_{12} time2 + \beta_{13} time3 + \beta_{14} time4 + \beta_{15} time6 + \beta_{16} time7 + \beta_{17} time8 + \beta_{18} time9 + \beta_{19} time10 + \beta_{20} time11 + \beta_{21} time12 + \beta_{22} time13 + \beta_{23} time14 + \beta_{24} time15 + \beta_{25} time16 + \beta_{26} time17 + \beta_{27} time18 + \beta_{28} time19 + \beta_{29} time20 + \beta_{30} time21 + \beta_{31} time22 + \beta_{32} time23 + \beta_{33} time24 + \beta_{34} time25 + \beta_{35} time26 + u_{it}$

Table 6.2: Regression results of the FE-model

Dependent variable: lnTotImPG			
Variable	**Coefficient**	**Standard error**	**P>|t|**
ChinaPGofTotIm	-0.8546	0.1476	0.000
Constant	10.3339	0.0562	0.000
group 1	0.3017	0.0423	0.000
group 2	0.4760	0.0455	0.000
group 4	-0.4328	0.0424	0.000
group 5	0.8983	0.0425	0.000
group 6	-2.308	0.0609	0.000

group 7	-1.1471	0.0431	0.000
group 8	-1.1895	0.0424	0.000
group 9	0.4981	0.0423	0.000
group 10	-0.5881	0.0424	0.000
time 1980	-0.4927	0.0682	0.000
time 1981	-0.3687	0.0682	0.000
time 1982	-0.2663	0.0682	0.000
time 1983	-0.1803	0.0682	0.000
time 1985	0.2787	0.0682	0.000
time 1986	0.47056	0.0682	0.000
time 1987	0.4826	0.0682	0.000
time 1988	0.3496	0.0682	0.000
time 1989	0.3025	0.0683	0.000
time 1990	0.4025	0.0684	0.000
time 1991	0.4401	0.0686	0.000
time 1992	0.5147	0.0688	0.000
time 1993	0.5704	0.0691	0.000
time 1994	0.7087	0.0692	0.000
time 1995	0.7865	0.0692	0.000
time 1996	0.8516	0.0695	0.000
time 1997	0.9676	0.0696	0.000
time 1998	1.0794	0.0696	0.000
time 1999	1.0885	0.0699	0.000
time 2000	1.1630	0.0701	0.000
time 2001	1.1626	0.0701	0.000
time 2002	1.1416	0.0704	0.000
time 2003	1.1995	0.0709	0.000
time 2004	1.3387	0.0716	0.000
time 2005	1.4276	0.0725	0.000
F-test	**389.20**		
R^2	**0.9838**		
Number of obs.	**260**		

6.1.2 Interpretation of the FE results

In this model the null hypothesis is rejected and according to the F-statistics, the model is statistical significant. Each independent variable has a t-test that illustrate if the coefficients are statistical significant. Here in my model every t-test shows significant variables at a 5 percent significant level. β_1 *100 is the percentage effect on the imported product groups' value of an increase in the share of imported product group from China. An increase in the import share from China has a negative effect on the total value of the imported product groups, with an 85.5 percent influence. This is expected, as there has been a significant increase in import of "low price products" from China. However, it is important to notice that the variable ChinaPGofTotIm is made from the dependent variable. This means that the regression equation is:

4. $y = \beta_0 + \beta_1 (\frac{x}{y}) + ... + u$.

When independent variables are made from the dependent variable, correlation can easily rise and affect the R^2 value and make it unusually high. This can be the case here since I got an R^2 that is 0. 9838, which means that 98.38 percent of the variation in imported product groups is described by the independent variables. By changing this term with a variable that is not correlated with the dependent variable the R^2 can change into a more "normal" level. By doing the same regression model as earlier, except that variable *ChinaPGofTotIm* is replaced with variable *ChinaPG*, I get that the *ChinaPG* variable affects the total import level with -0.0007 percent[29]. Although, the new variable doesn't affect the dependent variable very much, the R^2 is still quite large, more exactly 0.9821. Neither is there any significant changes after I took the logarithm of the variable, the R^2 is still 0.9845 (x= 0,074). Given this, it seems like the correlation between the dependent variable and the *ChinaPGofTotIm* is not as noteworthy after all. Correlation tests show that there is a negative 0.29 percent correlation between these main variables and the correlation between *lnTotImPG* and the *ChinaPG* is positive 0.38[30].

After this it follows a long list of dummy variables in my regression. When *lnTotImPG* is the dependent variable in the model, the coefficients on a dummy variable when multiplied by 100, it's interpreted as the percentage different in *lnTotImPG*, holding all other factors fixed. However, when a dummy variables coefficient suggests a large proportionate change in

[29] See Appendix 4, table A4.1 for more details. To see the effect of including lnChinaPG, see table A4.2 in Appendix 4.
[30] Correlation tables in Appendix 4, table A4.3 and A4.4.

lnTotImPG, the exact percentage difference can be obtained exactly with a semi-elasticity calculation:

$(e^D - 1)*100$, where D is a dummy variable.

Table 6.3: Recalculated dummy variables

Variable	**Recalculated Coefficient**
group 1	35%
group 2	61%
group 4	-35%
group 5	145%
group 6	-90%
group 7	-68%
group 8	-69%
group 9	65%
group 10	-45%
time 1980	-39%
time 1981	-31%
time 1982	-23%
time 1983	-16%
time 1985	32%
time 1986	60%
time 1987	62%
time 1988	42%
time 1989	35%
time 1990	50%
time 1991	55%
time 1992	67%
time 1993	77%
time 1994	102%
time 1995	120%
time 1996	134%
time 1997	163%
time 1998	191%
time 1999	197%
time 2000	219%
time 2001	219%
time 2002	213%
time 2003	232%
time 2004	278%
time 2005	214%

Each product group imported from China has also a significant effect on the product group of the total import to Norway. Each group is strongly significant; however there is variation in the effect, positive or negative. I see that it's the product group that has experienced the largest increase in the Chinese import share is also those that has some of the largest effects on total import level. This is as expected, as the import from China often has a lower import price than others. As the import size from China grow, this effect is more and more obvious. Group 6, which is travel goods and purses, had an import share of 1.5 percent in 1980. However in 2005 the import share has increased to 50.3 percent. Noticeable there has been a big change in the import pattern in Norway when it comes to that group indicator and therefore it is no wonder it had affected the total import level. The group 6; travel goods, represents the estimated difference in intercepts between group 6 and the base year, more exactly a negative 68 percent effect. Group 7; shoes, has also experienced a significant increase in import share, from 0.34 percent in 1980 to 27.1 in 2005. And the marginal effect of group 7 is negative 69 percent.

In the following we have 26 time effects variables. As I have excluded time 5 it follows that year 1984 is the base year, which means that the time effects are interpreted in accordance with this year. From the table 5.2 it is especially after 2000(from variable time21) the time variables have had an increased effect. This can be seen in connection with Chinas entrance into the WTO which happened in December 2000.

6.1.3 Tests for the FE-results

To conclude I need to do some test of the independent variables. The t-test that STATA reports tells me that the coefficients are significant at a 5 percent significance level. However it is important to control for heteroskedasticity. The null hypothesis in the Breusch- Pagan test is a constant variance. Large t-tests reject the null hypothesis which means that the model is experiencing heteroskedasticity.

Table 6.3: Breusch- Pagan test for the FE-model

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lnTotImPG
Chi2(1) = 1.65
Prob > chi2 = 0.1992

The Breusch-Pagan test indicates that the null hypothesis is not rejected, and the data set does not suffer from heteroskedasticity. Another important test is the Durbin-Watson test. It tests if there is no autocorrelation in the data, i.e. the residuals are not correlated.

Table 6.4: Durbin-Watson test for the FE-model

Durbin-Watson d-statistic (36, 26) = 1.945739

Autocorrelation causes the usual OLS statistics to be misleading. Luckily the Durbin-Watson test indicates there is no autocorrelation in my data set which means the residuals are independent of each other in the multiple regressions.

Multicollinearity

The following table shows the results of the VIF-test:

Table 6.5: Multicollinearity test for the FE-model

Variable |	VIF	1/VIF
group6 |	3.59	0.278853
ChinaPGofT |	3.59	0.278893
group2 |	2.06	0.484595
group7 |	1.85	0.539336
group5 |	1.81	0.550968
group10 |	1.81	0.552010
group8 |	1.81	0.553797
group4 |	1.80	0.554361
group9 |	1.80	0.554796
group1 |	1.80	0.555508
time26 |	1.53	0.655207
time25 |	1.50	0.666988
time1 |	1.48	0.674119
time2 |	1.48	0.674146
time3 |	1.48	0.674380
time4 |	1.48	0.674895
time6 |	1.48	0.677399
time7 |	1.47	0.678545
time8 |	1.47	0.680500
time23 |	1.46	0.682992
time9 |	1.46	0.683407
time22 |	1.46	0.685318
time21 |	1.46	0.686021
time10 |	1.46	0.687125
time20 |	1.45	0.687618
time11 |	1.45	0.688979
time19 |	1.45	0.690104
time18 |	1.45	0.690475
time17 |	1.45	0.690754
time12 |	1.45	0.691944
time15 |	1.44	0.692318
time16 |	1.44	0.692495
time14 |	1.44	0.693107
time13 |	1.44	0.693302
Mean VIF |	**1.68**	

The 1/VIF column in the vif-table gives values equal $1\text{-}R^2$ from the regression of each x on the other x variables, in other means it tells us how much of the variance to x that are independent from the remainder x variables. Large values indicate that the explanatory variables have a great deal of independent explanatory power. The table shows that most of the 1/VIF-values are around 0.6 percent, which means that they have a 60 percent independent variance.

The VIF-values reflects the degree to which other coefficients` variance is increased due to another included variable. The VIF values indicate how much of an increase in the variance we can expect by adding it to a model. But what is too much variance inflation? According to Chatterjee, Hadi, and Price (Chatterjee 2000) a VIF that is larger than 10 or if the mean VIF is larger than 1, there is sign of multicollinarity.

The model has no signs of large VIF-values. None of them are close to 10, however the mean VIF is clearly larger than 1. On the other hand all the variables included in the model are significant different from zero. For this reason the multicollinarity in this regression model does not necessarily create a big problem or require a solution. I choose therefore to live with this in an otherwise acceptable model.

6.2.1 Results of the FE-model estimated by OLS, alternative specification

By using an alternative dataset I will see if there are some kinds of similarity between two different dataset that have different variables. The regression model is:

2. $\text{lnPriceTotal} = \beta_0 + \beta_1 \text{ChinaPGofTotIm} + \beta_2 \text{group1} + \beta_3 \text{group2} + \beta_4 \text{group4} + \beta_5 \text{group5} + \beta_6 \text{group6} + \beta_7 \text{group7} + \beta_8 \text{group8} + \beta_9 \text{group9} + \beta_{10} \text{group10} + \beta_{11} \text{time1} + \beta_{12} \text{time2} + \beta_{13} \text{time3} + \beta_{14} \text{time4} + \beta_{15} \text{time6} + \beta_{16} \text{time7} + \beta_{17} \text{time8} + \beta_{18} \text{time9} + \beta_{19} \text{time10} + \beta_{20} \text{time11} + \beta_{21} \text{time12} + \beta_{22} \text{time13} + \beta_{23} \text{time14} + \beta_{24} \text{time15} + \beta_{25} \text{time16} + \beta_{26} \text{time17} + \beta_{27} \text{time18} + \beta_{28} \text{time19} + \beta_{29} \text{time20} + \beta_{30} \text{time21} + \beta_{31} \text{time22} + \beta_{32} \text{time23} + \beta_{33} \text{time24} + \beta_{34} \text{time25} + \beta_{35} \text{time26} + u_{it}$

Table 6.6: Regression result of the FE-model, alternative specification

Dependent variable: lnPriceTotal			
Variable	**Coefficient**	**Standard error**	**P>|t|**
ChinaPGofTotIm	-0.6127965	0.1319793	0.000
Constant	5.424263	0.0502069	0.000
group 1	0.4817339	0.0378259	0.000
group 2	-0.3100169	0.0407089	0.000
group 4	-2.328632	0.0378682	0.000
group 5	-1.738902	0.037994	0.000
group 6	-1.028963	0.0544598	0.000
group 7	-0.7672515	0.0384342	0.000
group 8	-3.509837	0.037889	0.000
group 9	-1.71129	0.0378521	0.000
group 10	0.3291012	0.0379552	0.000
time 1980	-0.2706546	0.0609922	0.000
time 1981	-0.2348203	0.0609922	0.000
time 1982	-0.1579086	0.0609917	0.010
time 1983	-0.0745809	0.0609907	0.223
time 1985	0.0952421	0.0609902	0.120
time 1986	0.1602654	0.0609924	0.009
time 1987	0.1960133	0.0610005	0.002
time 1988	0.029522	0.061025	0.001
time 1989	0.2402667	0.0610888	0.000
time 1990	0.2803861	0.0611434	0.000
time 1991	0.2980668	0.0613079	0.000
time 1992	0.322741	0.0615558	0.000
time 1993	0.3550752	0.0617552	0.000
time 1994	0.3460326	0.0619392	0.000
time 1995	0.3501479	0.061906	0.000
time 1996	0.3531248	0.06217	0.000
time 1997	0.3762636	0.0622046	0.000
time 1998	0.4218267	0.062249	0.000
time 1999	0.4135691	0.0625112	0.000
time 2000	0.4412567	0.06266	0.000
time 2001	0.4541568	0.0627223	0.000
time 2002	0.3759184	0.0629185	0.000
time 2003	0.3712576	0.0634237	0.000
time 2004	0.4075028	0.0640669	0.000
time 2005	0.3275559	0.0648195	0.000

F-test	**590.69**		
R^2	**0.9893**		
Number of obs.	**260**		

6.2.2 Interpretation of the alternative FE-results

The null hypothesis assumes that the independent variables; the average kg-price for different product groups imported from China, do not influence the average kg-price for the whole sample. In this model the null hypothesis is rejected and the F-test show that the model is statistical significant. Each independent variable has a t-test that illustrate if the coefficients are statistical significant. Here in my model every t-test shows significant variables at a 5 percent significant level. Most of my independent variables are significant at this level, except the years 1983 and 1985. β_1 *100 is the percentage effect on the imported product groups price of an increase in the share of imported product group from China. An increase in the import share from China has a negative effect on the total average kg-price of the imported product groups, with a 61.3 percentage influence. This is as expected, due to relatively lower prices from China. Also here is the independent variable *ChinaPGofTotIm* a correlation with the dependent variable. To see if this regression models R^2 is affected by this, I do some regression with *ChinaPrice* as variable, also as a logarithm form[31]. This is because of a quite large R^2; 98.9 percent of the variation in imported product groups is described by the independent variables. When adding the independent variable *ChinaPrice*, both the standard and the logarithmic form are not significant for the model, this at 24.5 and 44.5 percent significant level and do therefore not affect the R^2. Because of this I do a regression with the Chinese price as a lagged variable to test if the variable becomes significant at a 5 percent level. The regression variable is still not significant and the lagged variable is not significant before a 75.8 significant level[32].

[31] See Appendix 4 for more details, table A4.5 and A4.6
[32] See Appendix 4 for more details, table A4.7

Also here it follows a long list of dummy variables in my regression. Since the dependent variable has a logarithmic form, I need to recalculate dummy variables results:

Table 6.7: Recalculated dummy variables

Variable	**Recalculated Coefficient**
group 1	61.9 %
group 2	- 26.6 %
group 4	- 90.2 %
group 5	- 82.4 %
group 6	- 63.9 %
group 7	- 53.6 %
group 8	- 97.0 %
group 9	- 81.7 %
group 10	- 38.9 %
time 1980	- 23.7 %
time 1981	- 20.8 %
time 1982	- 14.6 %
time 1983	- 7.2 %
time 1985	9.9 %
time 1986	17.3 %
time 1987	21.6 %
time 1988	22.4 %
time 1989	27.1 %
time 1990	32.3 %
time 1991	34.7 %
time 1992	39.3 %
time 1993	42.6 %
time 1994	41.9 %
time 1995	43.3 %
time 1996	41.9 %
time 1997	44.7 %
time 1998	52.1 %
time 1999	51.1 %
time 2000	55.2 %
time 2001	57.5 %
time 2002	44.7%
time 2003	44.7 %
time 2004	50.2 %
time 2005	38.7 %

Each product group imported from China has a significant effect on the average price of the different product groups. Each group is strongly significant; every product group, except the office supply (group 1), has a negative effect on the average import price for the group. Its peculiar why this group doesn't have a negative effect since the computer-and-office-supply group has experienced quite an increase in the import share. In 1980, 0.0034 percent of total import of office supply was coming from China. In 2005, China was in charge of 18.3 percent of the office supply import in Norway. Since there has been a significant increase in import from China there is reason to believe that the Chinese goods would depress the prices of the substitutable goods from other countries and therefore also lower the average price.

Next we have 26 time effects variables. As earlier the base year is 1984. Table 5.2 shows a continuous pattern regarding the time variables. The time effect has a slightly upward trend. Later years has a more significant effect.

6.2.3 Tests for the alternative FE-results

Before I conclude, some tests need to be done. To find out if there is heteroskedasticity in the model one may use the Breusch- Pagan test.

Table 6.7: Breusch-Pagan test of the FE-model, alternative specification

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lnPriceTotal
chi2(1) = 19.21
Prob > chi2 = 0.0000

The Breusch-Pagan test indicates that the null hypothesis is rejected and the data set suffers from heteroskedasticity. Heteroskedasticity does not cause bias or inconsistency but the variables are no longer BLUE. Therefore it's possible to find estimators that are more efficient. By adding a term robust in the regression command you get robust standard deviations. This regression takes heteroskedasticity into consideration and therefore makes a better estimate.

3. $lnPriceTotal = \beta_0 + \beta_1 ChinaPGofTotIm + \beta_2 group1 + \beta_3 group2 + \beta_4 group4 + \beta_5 group5 + \beta_6 group6 + \beta_7 group7 + \beta_8 group8 + \beta_9 group9 + \beta_{10} group10 + \beta_{11} time1 + \beta_{12} time2 + \beta_{13} time3 + \beta_{14} time4 + \beta_{15} time6 + \beta_{16} time7 + \beta_{17} time8 + \beta_{18} time9 + \beta_{19} time10 + \beta_{20} time11 + \beta_{21} time12 + \beta_{22} time13 + \beta_{23} time14 + \beta_{24} time15 + \beta_{25} time16 + \beta_{26} time17 + \beta_{27} time18 + \beta_{28} time19 + \beta_{29} time20 + \beta_{30} time21 + \beta_{31} time22 + \beta_{32} time23 + \beta_{33} time24 + \beta_{34} time25 + \beta_{35} time26 + u_{it}$, robust

Table 6.8: Regression results of the robust FE-model, alternative specification

Dependent variable: lnPriceTotal			
Variable	**Coefficient**	**Robust Standard error**	**P>|t|**
ChinaPGofTotIm	-0.6127965	0.1583924	0.000
Constant	5.424263	.05997	0.000
group 1	0.4817339	.0437172	0.000
group 2	-0.3100169	.0519758	0.000
group 4	-2.328632	.0325649	0.000
group 5	-1.738902	.05174	0.000
group 6	-1.028963	.0675934	0.000
group 7	-0.7672515	0347492	0.000
group 8	-3.509837	.0325603	0.000
group 9	-1.71129	.0335923	0.000
group 10	0.3291012	.0460079	0.000
time 1980	-0.2706546	.0771148	0.001
time 1981	-0.2348203	.0713895	0.001
time 1982	-0.1579086	.0740558	0.034
time 1983	-0.0745809	.0700609	0.228
time 1985	0.0952421	.0737148	0.198
time 1986	0.1602654	.0697056	0.022
time 1987	0.1960133	.0669474	0.004
time 1988	0.029522	.0566894	0.000
time 1989	0.2402667	.0573932	0.000
time 1990	0.2803861	.0582611	0.000
time 1991	0.2980668	.061678	0.000
time 1992	0.322741	.0616905	0.000
time 1993	0.3550752	.0602038	0.000
time 1994	0.3460326	.0598459	0.000
time 1995	0.3501479	.0595587	0.000
time 1996	0.3531248	.0605836	0.000
time 1997	0.3762636	.0606372	0.000
time 1998	0.4218267	.0655249	0.000

time 1999	0.4135691	.072191	0.000
time 2000	0.4412567	.0657678	0.000
time 2001	0.4541568	.0634665	0.000
time 2002	0.3759184	.064321	0.000
time 2003	0.3712576	.0692392	0.000
time 2004	0.4075028	.0759307	0.000
time 2005	0.3275559	.1257862	0.010
F-test	**2277.92**		
R^2	**0.9893**		
Number of obs.	**260**		

From the model we see that there is somewhat of an increase in the variance for the "robust-model" but this does not indicate a big heteroskedasticity problem. Anyhow, homoskedasticity is needed to justify the F-and-t-tests. A robust – regression makes these tests valid again.

Given the t-test, most of the variables are still significant for the model at a 5 percent significant level. Nevertheless, some of the variables are not significant. These variables are the time variables 4 and 6, which is year 1883 and 1985, as in the former regression model without the robust command.

Durbin Watson test

Another important test is the Durbin-Watson test. It tests if there are autocorrelation in the data:

Table 6.9: Durbin- Watson test for the FE-model, alternative specification

Durbin-Watson d-statistic (36, 26) = 0. 41662274

The test indicates that the data set suffers from a positive autocorrelation. This causes the variance to be underestimated. This again increases the chance of doing a type-1 mistake; find significant coefficients which actually aren't significant.

If we detect autocorrelation in data sets we have to try and remove the autocorrelation, however this is really hard to do in panel data set. One way to deal with autocorrelation is to transform the model by using quasi-differenced data and thereafter apply the Generalized Least Squares method. Another solution is to include lagged variables. The latter solution may be preferable because it exploit the dynamic information that exists in the data set; earlier events influence the present. However, since removing correlation from panel date is very complicated I will just conclude with that autocorrelation in data sets effects the standard deviation and I therefore can not trust the result.

Table 6.10: Multicollinearity test for the FE-model, alternative specification

Variable |	VIF	1/VIF
ChinaPGTo|	3.88	0.257897
group6 |	3.73	0.267987
time26 |	2.17	0.460366
time25 |	2.12	0.471245
group2 |	2.09	0.479607
time24 |	2.08	0.480852
time23 |	2.05	0.488605
time22 |	2.03	0.491666
time21 |	2.03	0.492644
time20 |	2.02	0.494992
time19 |	2.00	0.499171
time18 |	2.00	0.499883
time17 |	2.00	0.500440
time15 |	1.98	0.504177
time16 |	1.98	0.504718
time14 |	1.97	0.507185
time13 |	1.96	0.510477
time12 |	1.94	0.514614
time11 |	1.93	0.517387
time10 |	1.93	0.518312
time9 |	1.93	0.519395
time8 |	1.92	0.519813
time7 |	1.92	0.519951
time1 |	1.92	0.519954
time2 |	1.92	0.519955
time3 |	1.92	0.519964
time4 |	1.92	0.519980
time6 |	1.92	0.519989
group7 |	1.86	0.538057
group5 |	1.82	0.550598
group10|	1.81	0.551723
group8 |	1.81	0.553654
group4 |	1.80	0.554264
group9 |	1.80	0.554734
group1 |	1.80	0.555504
Mean VIF |	**2.06**	

.

None of the VIF-values are close to 10, however the mean VIF is clearly larger than 1. On the other hand all the variables included in the model are significant different from zero. For this reason the multicollinarity in this regression model does not necessarily create a big problem or require a solution. I choose therefore to live with this in an otherwise acceptable model.

6.3 Model comparison

Both of the models indicate that China has an effect on Norwegian import. At first sight the alternative specification model seem to have an advantage given its choice of variables. It is more likely that the price level, at sector level, will be affected by an expansion of Chinese "low –priced" import than the total import value, at sector level. However, the model that has *lnPriceTotal* as dependent variable is experiencing autocorrelation and the variables that are significant in the regression may not be significant after all. Therefore, the first model will be preferable.

6.3 Result and interpretation of a time series estimated by OLS

The time series regression model is as followed:

4. $\ln CPI = \beta_0 + \beta_1 ChinaShare + \beta_2 time1980 + \beta_3 time1985 + \beta_4 time1990 + \beta_5 time1995 + \beta_6 time2000 + \beta_7 time2005 + u_t$

Table 6.11: Regression results of the time series estimated by OLS

Dependent variable: lnCPI			
Variable	Coefficient	Standard error	P>|t|
lnChinaShare	-0.0538402	0.010315	0.000
time1980	-0.0854255	0.0116906	0.000
time1985	-0.0213662	0.0107455	0.048
time1990	0. 0147612	0.0104275	0.158
time1995	0. 0186017	0.0095375	0.052
time2000	-0.0005676	0.009703	0.953
time2005	-0.0415539	0.0099941	0.012
LaggedCPI	0.00014915	0.0000525	0.000
Constant	2.942284	0. 08957	0.000
F(8.251)=	3223.79		
R^2 overall=	0.99		

Table 6.12: Recalculated dummy variables

Variable	**Recalculated Coefficient**
time1980	-0.08
time1985	-0.02
time1990	0.01
time1995	0.0018
time2000	0.0005
time2005	-0.04

From the model I see that the coefficient for the import share from China is negative as expected and also significantly different from zero. These results suggest that import from China have depressed the Norwegian import price inflation to some extent, 0.054 percent. According to this, the “China-effect” is surprisingly small in this model. However, this result can seem more or less like the same result that Kamin (Kamin 2004) and Koyuncu (Koyuncu 2006) found. They discovered that import prices from China have a decreasing effect on the US economy, respectively 0.70 and 0.17 percentage effect. The independent variables time1990, time1995 and time2000 are not significant at a 5 percent significance level. The variable time6 is significant at the previous significant level but not at a 1 percent level. It is obvious that including time variables makes the model better since most of them are significant. However, it is not possible to include the entire time variables because of a multicollinarity problem. Therefore I choose to include 6 time variables, every five year from 1980 to 2005. If there was only one time variable that I excluded from the model, the time effect could be interpreted in proportion to this base year. Nevertheless when excluding several time variables the interpretation of the remaining variables is much harder. The purpose of the lagged variable is to serve as a control variable for the effects of competition and market structure. The coefficient on the lagged variable is essentially zero, therefore it is unlikely a control variable in the manner described earlier[33].

Table 6.13: The Breusch-Pagan test and the Durbin-Watson test for the time series

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lnCPI
chi2(1) = 20.02
Prob > chi2 = 0.0000
Durbin-Watson d-statistic (8,26)= 0.91987803

According to these test there is both heteroskedasticity and autocorrelation in the dataset. Often autocorrelation is viewed as a more important problem than heteroskedasticity. This is because autocorrelation usually has a larger impact on standard errors and the efficiency of estimators than heteroskedasticity. According to the correlogram[34] we have a AR(1) autocorrelation, which means that the period before the present affects the present error term. To correct for the autocorrelation one can use the feasible Generalized Least Square

[33] See equation 2, 4.4.1
[34] See Appendix 5

procedure of Prais-Winsten[35]. The Durbin-Watson test is now 1.46, which means that the test is indefinite; the Durbin-Watson statistics is in the between the Durbin-Watson`s lower and upper level. According to this model, the Chinese import share has quite a little affect on the inflation level in Norway and may therefore indicate that the share of imported goods from China is still too small.

[35] See Appendix 5, table A5.1

Chapter 7: Summary

7.1 Review

The purpose of this paper has been to examine how the import in Norway, and thereby also the inflation level, is affected by the increased import shares from China. In chapter 3, a model from Kamin (2004) was presented which shows how import from China has affected the global inflation level. This model is the framework for my empirical analysis. According to this model, China's economy is still too small relative to the world economy to have much effect on the global inflation. Their empirical evidence *"identify a statistically significant effect of U.S. imports from China on U.S. import prices , but given the size of this effect and the relatively low shares of imports, the ultimate impact on the U.S. consumer prices has likely been quite small"*[36].

My empirical work shows similar results. The Chinese import share in Norway has a small and significant negative effect on the Norwegian consumer price level. According to this, there is only weak evidence that import from China has a significant effect on CPI. An explanation for this could be that during the last couple of years the economy has become less fluctuating and subject to fewer large shocks. This may complicate the work of identifying econometrical effects from Chinese import prices. Second, the expansion of supply capacity in China is considered to be a permanent structural change in the global economy. Therefore, to enhance a sustainable growth, each countries central bank has to implement structural reforms. Improvement in the monetary authority's policies may have led to better inflationary policy that makes the economy less sensitive to shocks. Third; globalization has made it easier to trade with other countries. Likely, this has given Norway additional benefits regarding low-cost benefit from other economies, like those in Eastern Europe. Last but not least; the process of making a world economy has been going on for years and years, much longer than fifteen years which I accounted for in this paper. Having a longer time period for this paper would maybe intercept the inflationary changes better.

However, my panel data regressions show that groups with large import shares from China have experienced decreased relative values in the total import level and also decreased

[36] Kamin (2004) , abstract

average prices for the total group level. This may indicate that the CPI-JAE does not capture the whole picture of how low-priced import from China affects the inflation process[37].

7.2 Critics

The results in my analysis show that import from China has a significant affect on Norway's economy. Since the data collection is somewhat limited these results should be interpreted with some precautions. Some proper price indexes are missing, e.g. CPI at sector level, this data would be preferable. It would then be easier to see which effect each product group has on the inflation level, and therefore also see if there are some that have a remarkable significant effect on the inflation level. For that reason, in any other potentially research within the same field, there is need for a more comprehensive data set. It would also be interesting to do some regressions with the CPI-JE as a dependent variable. This index does not count for energy goods; therefore it may be easier to capture more accurate results of the "China-effect". Increasing prices of raw materials has been raising the inflation level and thus neutralizing some of the effects the low- priced import has had on the inflation level.

[37] Also mentioned in "Critics"

References

Adams, F. G., Byron Gangnes and Yochanan Shachmurove (2006). "Why is China so Competitive?
Measuring and Explaining China's
Competitiveness." The World Economy **29**(2): 95-122.

Anderson, J. (2002). "Five Great Myths About China and the World." from www.gs.com.

Bernanke, B. S. (2007). Globalization and Monetary Policy. Speech at the Fourth Economic Summit, Stanford Institute for Economic Policy Research, Stanford,CA.

Blancher, N. a. R. (2004). "International Trade and the Challenges of WTO Accession." China's Growth and Integration into the World Economy(232).

Borio, C. a. A. F. (2006). "Globalisation and inflation: New cross-country evidence on the global determinants of domestic inflation."

Chatterjee, S., A.S. Hadi and B.Price (2000). Regression Analysis by Example. New York, John Wiley & Sons.

Clarida, R., Jordi Gali, and Mark Gertler (2002). "A simple framework for international monetary policy." Journal of Monetary Economics 30: 603-19.

Commission, T. E. (2004). The Challenge to the EU of a Rising Chinese Economy. 1397. SEC, European Competitiveness Report 2004**:** 255-256.

Economist, T. (2006). The new titans. The Economist.

Frank, R. H. (2003). Microeconomics and behavior, McGraw-Hill.

Fund, I. I. M. (2006). "How Has Globalization Changed Inflation?" World Economic Outlook(April).

Greene, M., Nora Dihel, Przemyslaw Kowalski and Douglas Lippoldt (2006). "China`s trade and growth: impact on selected OECD countries." OECD Trade Policy Working Paper No. 44(44): 100.

Hamilton, L. C. (2006). Statistics with STATA. Belmont, Thomson Higher Education.

Hanke, S. H. (2003). "John Snow is Wrong about China Exportinfg Deflation." Cato Institute *Daily Commentary*.

Hu, A. (2003). "Is China the Root Cause of Global Deflation?" China and the World Economy 11: 3-7.

Ihrig, J., Steven B. Kamin, Deborah Lindner, and Jaime Marquez (2007). "Some Simple Tests of the Globalization and Inflation Hypothesis." International Finance Discussion Papers, Board of Governors of the Federal Reserve System(891).

Kamin, S. B., Mario Marazzi, and John W. Schindler (2006). "The Impact of Chinese Exports on Global Import Prices." Review of International Economics 14(2): 179–201.

Kamin, S. B., Mario Marazzi, and John W.Svhindler (2004). "Is China "exporting"deflation?" International Financial Discussion Papers(Number 791).

Koyuncu, C. a. R. Y. (2006). "Can China Help Lower World Inflation?: A Panel Study " Emerging Markets Finance and Trade 42(2): 93 - 103

Lardy, N. R. (2005). "Exchange rate and monetary policy in China " Cato Journal 25(1).

M.Molnar (2005). China Embraces Globalisation: Strengthening Integration in Trade and Investment. LACEA 2005 conference. American University of Paris.

Morrison, K. a. C. S. (2003). Raw Material Prices Fuel New Inflation Fears. Finacial Times. October 27.

Moulton, B. R. (1996). "Bias in the Consumer Price index: What is the evidence?" Journal of Economic Perspectives Volume 10(4): pages 159-177.

Røstøen, J. Ø. (2004). "Internasjonale prisimpulser til importerte konsumvarer " Penger og Kreditt(02): 84-90.

Stock, J. H. a. M. W. W. (2007). Introduction to Econometrics Pearson Education, Inc.

Vårdal, E. (1994). International makroøkonomi, Bedriftsøkonomenes Forlag.

Wang, T. (2004). "Exchange Rate Dynamics." China’s Growth and Integration into the World Economy
Prospects and Challenges(232): 21-25.

Wooldridge, J. M. (2003). Introductory Economics: A Modern Approach, 2e, South-Western.

Internet pages:
http://www.tu.no/nyheter/fagartikler/article35260.ece
http://ssb.no/emner/09/ur_okonomi/

http://stats.oecd.org/glossary/detail.asp?ID=2466

http://www.ssb.no/emner/08/02/10/nos_c680/nos_c680.pdf
http://www.ssb.no/emner/09/01/begreper/

Appendix 1: Derivation of Supply Curves

Suppose that the production functions in China (C) and the rest of the world (R) are identical. Each countries production function depends on labour inputs. with capital and technology fixed and integrated in $\overline{S}^j$:

$$1. \quad Q^j = q^j(L^j) * \overline{S}^j \qquad \text{where j=C.R}$$

The standard first- and second order condition for the production functions give me:

$$q^{j'}(L^j) > 0$$

$$q^{j''}(L^j) < 0$$

In China. the producers solve the following problem

$$2. \quad \underset{L^C}{Max}\, P^C Q^C - w^C L^C$$

Equation 1 gives $Q^C = q^C(L^C) * \overline{S}^C$ therefore can equation 2 be written as:

$$3. \quad \underset{L^C}{Max}\, P^C q^C(L^C)\overline{S}^C - w^C L^C$$

By differentiating I get the first order condition:

$$4. \quad P^C q^{C'}(L^C)\overline{S}^C - w^C = 0 \Rightarrow q^{C'}(L^C) = \frac{w^C}{P^C * \overline{S}^C}$$

which defines an implicit labour demand function:

$$5. \quad L^{C^d} = L^{Cd}\left(\frac{w^C}{P^C * \overline{S}^C}\right)$$

When there is an increase in $\frac{w^C}{P^C * \overline{S}^C}$ the term $q^{C'}(L^C)$ must increase to maintain equality in equation 4. However. since the production function is concave I therefore know $q^{C'}$ is a decreasing function and if $\frac{w^C}{P^C * \overline{S}^C}$ increases. L^C must decrease.

Next I assume labour supply depends on the real consumption wage:

$$6. \quad L^{C^s} = L^{Cs}\left(\frac{w^C}{P}\right) \text{ where } P = (P^C)^{\delta}(P^R)^{(1-\delta)}$$

From this. the labour market equilibrium condition is:

$$7. \quad L^{Cd}\left(\frac{w^C}{P^C * \overline{S}^C}\right) = L^{Cs}\left(\frac{w^C}{P}\right)$$

I differentiate this expression:

$$8. \quad \frac{dL^{Cd}}{d(\frac{w^C}{P^{C*}\overline{S}^C})}\left[(P^C * \overline{S}^C)^{-1} dw^C - (\frac{w^C}{\overline{S}^C})(P^C)^{-2} dP^C - (\frac{w^C}{P^C})(\overline{S}^C)^{-2} d\overline{S}^C\right] =$$

$$\frac{dL^{Cs}}{d(\frac{w^C}{P})}\left[\frac{1}{P} dw^C - w^C (P)^{-2} dP\right]$$

Factoring out $\frac{w^C}{P^C * \overline{S}^C}$ in the left hand side (L^{Cd}) and $\frac{w^C}{P}$ in the right hand side (L^{C^s}):

$$9. \quad \frac{dL^{Cd}}{d(\frac{w^C}{P^{C*}\overline{S}^C})} * \frac{w^C}{P^C * \overline{S}^C}\left[\frac{dw^C}{w^C} - \frac{dP^C}{P^C} - \frac{d\overline{S}^C}{\overline{S}^C}\right] = \frac{dL^{Cs}}{d(\frac{w^C}{P})} * \frac{w^C}{P}\left[\frac{dw^C}{w^C} - \frac{dP}{P}\right]$$

Dividing by the labour market clearing condition and using notation $\hat{x} = \frac{dx}{x}$ and $\eta_{y,x} = \frac{dy}{dx}\frac{x}{y}$:

$$\eta_{L^{Cd}, \frac{w^C}{P^C \overline{S}^C}} *(\hat{w}^C - \hat{P}^C - \hat{\overline{S}}^C) = \eta_{L^{CS}, \frac{w^C}{P}} *(\hat{w}^C - \hat{P}) \text{ where } \hat{P} = \delta\, \hat{P}^C + (1-\delta)\, \hat{P}^R$$

Adding and subtracting $\eta_{L^{Cs}, \frac{w^C}{P}} *(1-\delta)\hat{P}^C$ from the right side of the expression. this equation

can be rewritten to decompose changes in the Chinese production real wage into two factors; first; changes in the non-Chinese real production wage and second; productivity increases.

$$10. \quad \hat{w}^C - \hat{P}^C = \frac{(1-\delta)\eta_{L^{Cs}, \frac{w^C}{P}}}{\eta_{L^{Cd}, \frac{w^C}{P^C \overline{S}^C}} - \eta_{L^{Cs}, \frac{w^C}{P}}}(\hat{P}^C - \hat{P}^R) + \frac{\eta_{L^{Cd}, \frac{w^C}{P^C \overline{S}^C}}}{\eta_{L^{Cd}, \frac{w^C}{P^C \overline{S}^C}} - \eta_{L^{Cs}, \frac{w^C}{P}}}\hat{\overline{S}}^C$$

From this I see that the changes in the Chinese real production wage is based on the elasticity to relative prices over time. and the elasticity to the productivity change.

Since $\eta_{L^{Cd}, \frac{w^C}{P^C \overline{S}^C}} < 0$. $\eta_{L^{Cs}, \frac{w^C}{P}} > 0$ and $\delta < 1$. an increase in $\frac{P^C}{P^R}$ would lower $\frac{w^C}{P^C}$. Based on the

assumption of a fixed technology it means that the total supply Q^C is increased. For the same

reason an increase in $\overline{S}^C$ raise $\frac{w^C}{P^C}$. Given that the price level is determined by the global

supply and demand the. I have $\hat{P} = \delta\, \hat{P}^C + (1-\delta)\, \hat{P}^R$ and $\hat{P}^C - \hat{P}^R = P^C / P^R$ I define the implicit supply function S for Chinese goods:

$$11. \quad S^C = S^C((\frac{P^C}{P^R})^{1-\delta};\ \overline{S}^C) = Q^C$$

The supply is given the relative price's weight level and the capital and technology in China.

This equation has the standard assumptions of supply functions:

$$\frac{\partial S^C}{\partial(\frac{P^C}{P^R})} > 0 \text{ and } \frac{\partial S^C}{\partial \overline{S}^C} > 0$$

The-rest-of-the-world has an equation analogue to equation 11:

$$12.\ \hat{w}^R - \hat{P}^R = -\frac{\delta\eta_{L^{Rs},\frac{w^R}{P}}}{\eta_{L^{Rd},\frac{w^R}{P^R\overline{S}^R}} - \eta_{L^{Rs},\frac{w^R}{P}}}(\hat{P}^C - \hat{P}^R) + \frac{\eta_{L^{Rd},\frac{w^R}{P^R\overline{S}^R}}}{\eta_{L^{Rd},\frac{w^R}{P^R\overline{S}^R}} - \eta_{L^{Rs},\frac{w^R}{P}}}\hat{\overline{S}}^R$$

From this the implicit supply function for the-rest-of-the-world s derived:

$$13.\ S^R = S^R\ ((\frac{P^C}{P^R})^{1-\delta};\ \overline{S}^R)=Q^R$$

which also has the usual properties of supply functions:

$$\frac{\partial S^R}{\partial(\frac{P^C}{P^R})} < 0 \text{ and } \frac{\partial S^R}{\partial \overline{S}^R} > 0$$

Appendix 2: Response of Prices to Chinese Supply Shock

There is a supply shock in China $\hat{S}^{C*}$. Equation 14 in the Model shows the goods market clearing condition in China:

$$1.\quad P^C S^C = \delta(M_C + M_R)$$

Assume $M_C + M_R = M$ is fixed. Taking logs and letting a lower case letter denote the log of a variable:

$$2.\quad p^C + s^C = \log(\delta) + m$$

Then I add time subscripts and taking the first difference of the equations:

$$3.\quad p_t^C - p_{t-1}^C + s_t^C - s_{t-1}^C = \log(\delta_t) - \log(\delta_{t-1})$$

Rearranging:

$$4.\quad \log\left(\frac{P_t^C}{P_{t-1}^C}\right) + \log\left(\frac{S_t^C}{S_{t-1}^C}\right) = \log\left(\frac{\delta_t}{\delta_{t-1}}\right)$$

Using the estimate $\log(1+x) \approx x$. this equation can be rewritten as:

$$5.\quad \hat{P}^C + \hat{S}^C = \hat{\delta}$$

Then I differentiate the equation 11($S_C = S_C\ ((\frac{P_C}{P_R})^{(1-\delta)}\ .\ \overline{S}^C)$) from Appendix 1:

$$6.\quad dS^C = S_1^C\left(\left(\frac{1}{P^R}\right)^{1-\delta}(1-\delta)(P^C)^{-\delta}dP^C + (\delta-1)(P^C)^{1-\delta}(P^R)^{\delta-2}dP^R\right) + S_2^C * dS^{c*}$$

The first thing I do here is to factor out the term $(\frac{P^C}{P^R})^{(1-\delta)}(1-\delta)$ out of the right hand side of the equation and dividing by S^C. The notation will be based on $\hat{x} = \frac{dx}{x}$ and $\eta_{y,x} = \frac{dy}{dx}\frac{x}{y}$:

$$7.\quad \hat{S}^C = (1-\delta)\,\eta_{S^C,(\frac{P^C}{P^R})^{1-\delta}}(\hat{P}^C - \hat{P}^R) + \eta_{S^C,S^{C*}} * \left(\frac{dS^{C*}}{S^{C*}}\right)$$

Where the supply has capital and technology fixed and incorporated into the supply function. the elasticity given China's supply and the elasticity of the share δ with respect to relative prices.

Similarly. because $\delta = \delta(P^C / P^R)$[38]. then I know:

$$8.\quad \hat{\delta} = \eta_{d,\frac{P^C}{P^R}}((\hat{P}^C - \hat{P}^R)$$

[38] The share factor is a function of relative prices and the η_d expresses the elasticity of the share factor δ with respect to relative prices. $\hat{\delta}$ is how the share factor react to changes in demand over time.

Plug equation 7 and 8 into 5:

$$9. \quad \hat{P}^C + (1-\delta)\eta_{S^C,(\frac{P^C}{P^R})^{1-\delta}}(\hat{P}^C - \hat{P}^R) + \eta_{S^C,S^{C*}} * (\frac{dS^{C*}}{S^{C*}}) = \eta_{d,\frac{P^C}{P^R}}((\hat{P}^C - \hat{P}^R)$$

To simplify the notation I have:

$$\hat{S}^{C*'} = \eta_{S^C,S^{C*}} * (\frac{dS^{C*}}{S^{C*}})$$

$$\eta_S = \eta_{S^C,(\frac{P^C}{P^R})^{!-\delta}}$$

$$\eta_d = \eta_{d,\frac{P^C}{P^R}}$$

Then I solve for $\hat{P}^C$:

$$10. \ \hat{P}^C = \frac{(1-\delta)\eta_S - \eta_d}{1+(1-\delta)\eta_S - \eta_d}\hat{P}^R - \frac{1}{1+(1-\delta)\eta_S - \eta_d}\hat{S}^{C*'}$$

To find the rest-of-the-world price inflation we start also here with the marked equilibrium of goods. This is given by:

$$11. \ P_R S_R = (1-\delta)(M_C + M_R)$$

Assume that $M_C + M_R = M$ is fixed. To express the goods market equilibrium condition in percent change term I take logs of the variables. then I take the first difference of the equations. $\frac{\partial(1-\delta)}{1-\delta} = -\frac{1}{1-\delta} * \frac{\partial\delta}{\delta}\delta$. and end it all by using the approximation of log $(1+x) \approx x$.

$$12. \ \hat{P}^R + \hat{S}^R = (\hat{1} - \hat{\delta}) = -\frac{\delta}{1-\delta}\hat{\delta}$$

Then I total differentiate the equation 12 from appendix 1. I assume there are no supply shocks in non-China. By factoring out $\delta(\frac{P^C}{P^R})^\delta$ of the equation 12 and then divide by S^R I get:

$$13.\ \hat{S}^R = \delta\ \eta_{S^R,(\frac{P^C}{P^R})^\delta}(\hat{P}^C - \hat{P}^R)$$

To get equation 14 I do the same as in equation 8:

$$14.\ \hat{\delta} = \eta_{d,\frac{P^C}{P^R}}(\hat{P}^C - \hat{P}^R)$$

Plug equation 13 and 14 into 12:

$$15.\ \hat{P}^R - \delta\ \eta_S(\hat{P}^C - \hat{P}^R) = -\frac{\delta}{1-\delta}\eta_d\ (\hat{P}^C - \hat{P}^R)$$

where I have simplified notations as follows:

$$\eta_S = \eta_{S^C,(\frac{P^C}{P^R})^{!-\delta}} = -\eta_{S^R,(\frac{P^C}{P^R})^\delta}$$

$$\eta_d = \eta_{d,\frac{P^C}{P^R}}$$

Then I solve for $\hat{P}^R$:

$$16.\ \hat{P}^R = \frac{\delta(1-\delta)\eta_S - \delta\eta_d}{1-\delta+\delta(1-\delta)\eta_S - \delta\eta_d}\hat{P}^C$$

By using this equation I can solve the Chinese inflation equation by plugging equation 16 in equation 10:

$$17.\ \hat{P}^C = -\frac{1-\delta+\delta((1-\delta)\eta_S - \eta_d)}{1-\delta+(1-\delta)\eta_S - \eta_d}\overline{S}^{C*}$$

We can use this equation to solve for the rest-of-the-world inflation. put expression 17 in expression 16:

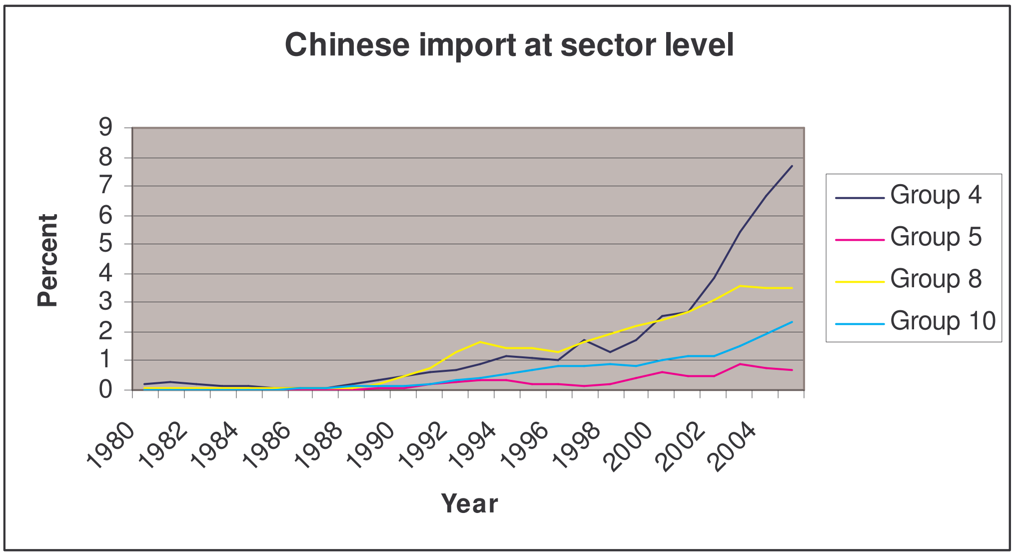
$$18.\ \hat{P}^R = -\frac{\delta((1-\delta)\eta_S - \eta_d)}{1-\delta+(1-\delta)\eta_S - \eta_d}\overline{S}^{C*}$$

Finally. I solve for the global CPI:

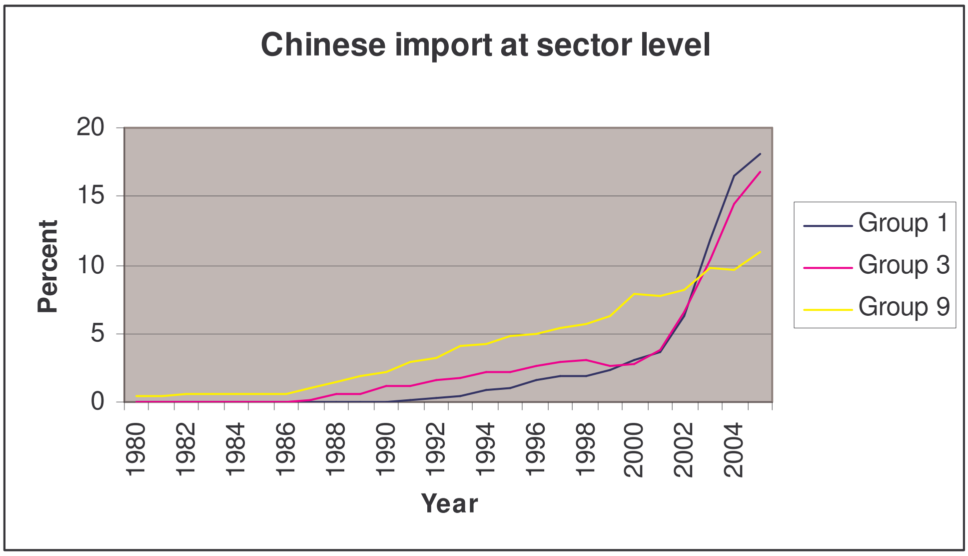
$$19.\ \hat{P} = \delta\hat{P}^C + (1+\delta)\hat{P}^R = -\delta\overline{S}^{C*}$$

Appendix 3: Development in sector groups

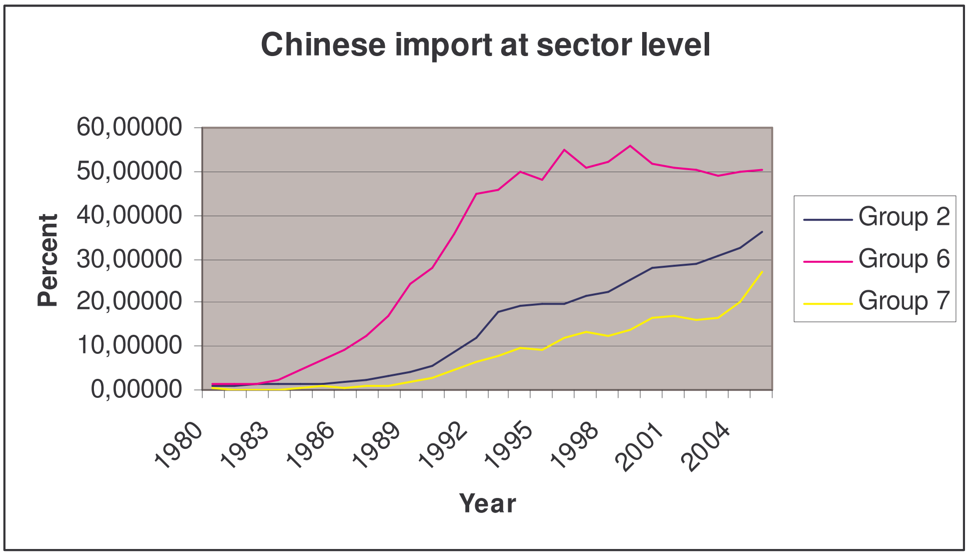
Graph 1



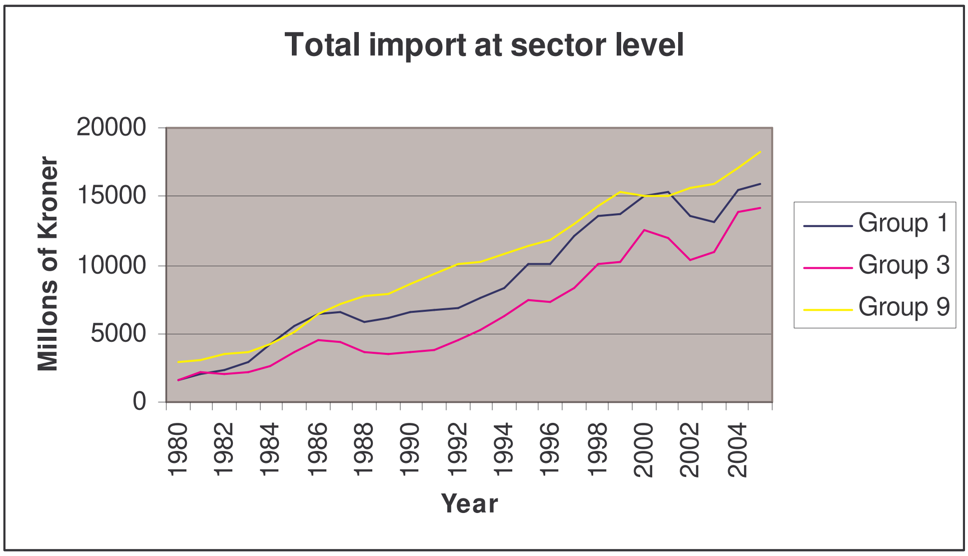
Graph 2



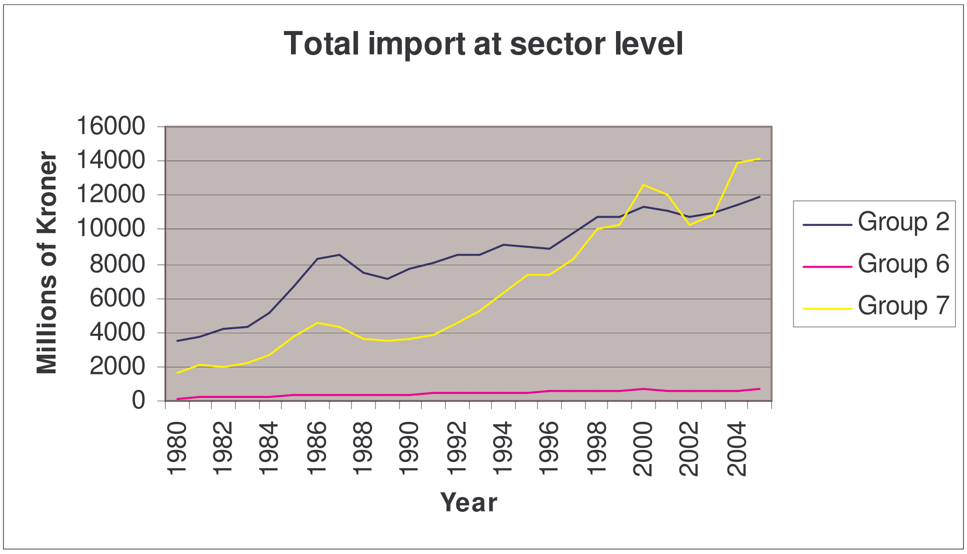
Graph 3



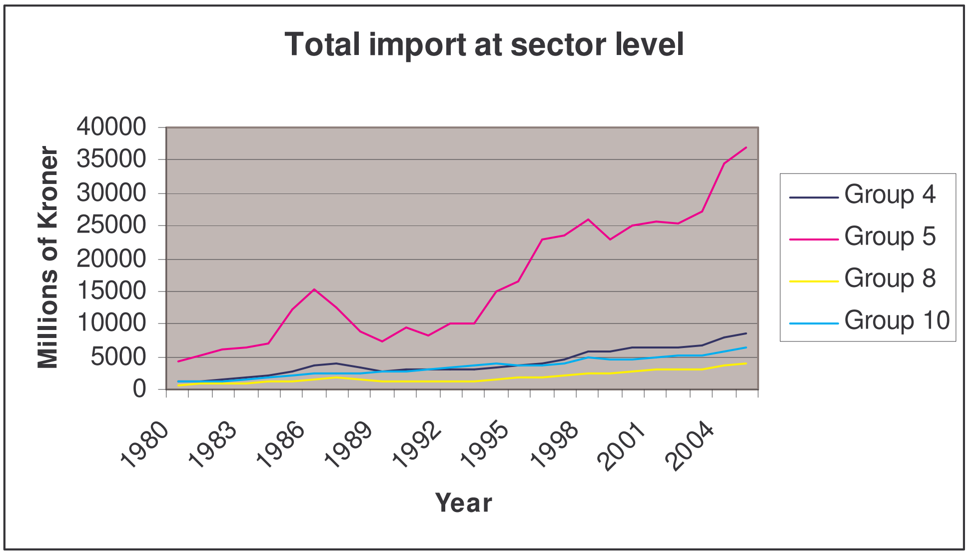
Graph 4



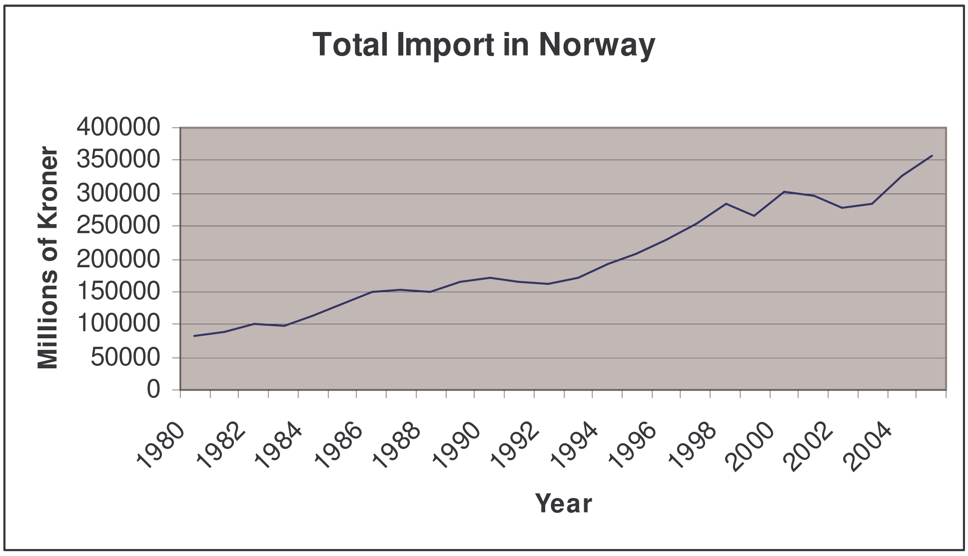
Graph 6



Graph 7



Graph 8



Total Import in Norway
400000
350000
300000
250000
200000
150000
100000
50000
0
Millions of Kroner
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
Year

Appendix 4: Panel data regression models

Table A4.1:

Source	SS	df	MS		
Model	316.402979	35	9.04008511	Number of obs	260
Residual	5.76182206	224	.02572242	F(35, 224)	351.45
Total	322.164801	259	1.24387954	Prob > F	0.0000
				R-squared	0.9821
				Adj R-squared	0.9793
				Root MSE	.16038

lnTotImPG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ChinaPG	-6.99e-06	2.34e-06	-2.99	0.003	-.0000116	-2.38e-06
group1	.3081656	.0445027	6.92	0.000	.2204681	.3958631
group2	.4580382	.0518209	8.84	0.000	.3559194	.5601571
group4	-.4369478	.0448027	-9.75	0.000	-.5252364	-.3486592
group5	.9027606	.0449214	20.10	0.000	.814238	.9912833
group6	-2.573743	.0446409	-57.65	0.000	-2.661713	-2.485773
group7	-1.201774	.0446236	-26.93	0.000	-1.28971	-1.113838
group8	-1.195893	.0450185	-26.56	0.000	-1.284607	-1.107179
group9	.5047607	.0448072	11.27	0.000	.4164632	.5930582
group10	-.5887273	.0450371	-13.07	0.000	-.6774778	-.4999767
time1	-.4895057	.0717253	-6.82	0.000	-.6308483	-.3481631
time2	-.365496	.0717252	-5.10	0.000	-.5068385	-.2241536
time3	-.263321	.0717251	-3.67	0.000	-.4046634	-.1219787
time4	-.1781145	.0717251	-2.48	0.014	-.3194567	-.0367722
time6	.2771304	.0717251	3.86	0.000	.1357881	.4184726
time7	.4674883	.0717255	6.52	0.000	.3261452	.6088314
time8	.476587	.0717267	6.64	0.000	.3352416	.6179323
time9	.3384254	.0717292	4.72	0.000	.1970751	.4797757
time10	.2833052	.071734	3.95	0.000	.1419455	.4246649
time11	.3793526	.0717438	5.29	0.000	.2379736	.5207317
time12	.4078857	.0717775	5.68	0.000	.2664401	.5493312
time13	.4721583	.0718251	6.57	0.000	.3306189	.6136977
time14	.5240163	.0719333	7.28	0.000	.3822637	.6657689
time15	.6583972	.0720242	9.14	0.000	.5164655	.8003289
time16	.7385476	.0720574	10.25	0.000	.5965506	.8805447
time17	.7957817	.0721093	11.04	0.000	.6536824	.9378811
time18	.9158407	.0723099	12.67	0.000	.773346	1.058335
time19	1.029887	.0724772	14.21	0.000	.8870622	1.172711
time20	1.035205	.0726977	14.24	0.000	.8919457	1.178463
time21	1.113375	.0731804	15.21	0.000	.9691652	1.257585
time22	1.111905	.0732252	15.18	0.000	.9676071	1.256204
time23	1.090002	.0735363	14.82	0.000	.9450902	1.234913
time24	1.149677	.0747423	15.38	0.000	1.002389	1.296965
time25	1.293333	.0767428	16.85	0.000	1.142102	1.444563
time26	1.38206	.0786621	17.57	0.000	1.227048	1.537073
_cons	10.36139	.0588447	176.08	0.000	10.24543	10.47735

Table A4.2:

Source	SS	df	MS		
Model	317.167945	35	9.06194129	Number of obs =	260
Residual	4.99685574	224	.022307392	F(35, 224) =	406.23
Total	322.164801	259	1.24387954	Prob > F =	0.0000
				R-squared =	0.9845
				Adj R-squared =	0.9821
				Root MSE =	.14936

lnTotImPG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnChinaPG	.0737644	.0110451	6.68	0.000	.0519988	.09553
group1	.3612607	.0422988	8.54	0.000	.2779062	.4446153
group2	.1552233	.0532365	2.92	0.004	.0503148	.2601318
group4	-.4061818	.041483	-9.79	0.000	-.4879287	-.3244349
group5	1.022917	.0441197	23.19	0.000	.9359745	1.10986
group6	-2.637981	.0429387	-61.44	0.000	-2.722596	-2.553366
group7	-1.238816	.0420344	-29.47	0.000	-1.321649	-1.155983
group8	-1.085649	.043539	-24.94	0.000	-1.171447	-.9998505
group9	.3384369	.0471364	7.18	0.000	.2455495	.4313244
group10	-.452922	.0448448	-10.10	0.000	-.5412938	-.3645503
time1	-.3970825	.0681967	-5.82	0.000	-.5314717	-.2626933
time2	-.2977465	.0675509	-4.41	0.000	-.430863	-.1646299
time3	-.221734	.0670795	-3.31	0.001	-.3539217	-.0895464
time4	-.1410442	.0670215	-2.10	0.036	-.2731176	-.0089708
time6	.2575186	.0668576	3.85	0.000	.1257682	.389269
time7	.3845805	.0679176	5.66	0.000	.2507412	.5184197
time8	.3651575	.068795	5.31	0.000	.2295892	.5007257
time9	.2061377	.0695724	2.96	0.003	.0690375	.3432379
time10	.112953	.0713202	1.58	0.115	-.0275914	.2534975
time11	.1755967	.0731306	2.40	0.017	.0314846	.3197087
time12	.1693423	.0751734	2.25	0.025	.0212049	.3174798
time13	.1993579	.0774226	2.57	0.011	.046788	.3519278
time14	.225642	.0790233	2.86	0.005	.0699178	.3813663
time15	.333903	.0809049	4.13	0.000	.1744709	.493335
time16	.4082943	.0813039	5.02	0.000	.248076	.5685127
time17	.451009	.0824257	5.47	0.000	.28858	.6134379
time18	.5514649	.0837063	6.59	0.000	.3865124	.7164174
time19	.6493643	.0848428	7.65	0.000	.4821721	.8165565
time20	.6414711	.0856721	7.49	0.000	.4726447	.8102975
time21	.6912351	.0876196	7.89	0.000	.518571	.8638992
time22	.6851586	.0880022	7.79	0.000	.5117404	.8585768
time23	.6489921	.08897	7.29	0.000	.4736669	.8243173
time24	.6711441	.0912985	7.35	0.000	.4912304	.8510579
time25	.7780792	.0931532	8.35	0.000	.5945106	.9616479
time26	.8388571	.0945186	8.88	0.000	.6525977	1.025117
_cons	10.16047	.0624615	162.67	0.000	10.03738	10.28355

Table A4.3: Correlation 1

	lnTotImPG	ChinaPGofTotim
lnTotImPG	1.0000	
ChinaPGofT~m	-0.2909	1.0000

Table A4.4: Correlation 2

	lnTotImPG	ChinaPG
lnTotImPG	1.0000	
ChinaPG	0.3760	1.0000

Table A4.5: Regression 1, Alternative specification

Source	SS	df	MS		
				Number of obs =	260
				F(35, 224) =	541.58
Model	384.137745	35	10.9753641	Prob > F =	0.0000
Residual	4.53948118	224	.020265541	R-squared =	0.9883
				Adj R-squared =	0.9865
Total	388.677226	259	1.50068427	Root MSE =	.14236

lnPriceTotal	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
PriceChina	.0002579	.0002211	1.17	0.245	-.0001778	.0006937
group1	.4648408	.0425747	10.92	0.000	.3809426	.548739
group2	-.3674187	.040908	-8.98	0.000	-.4480324	-.286805
group4	-2.290491	.0469636	-48.77	0.000	-2.383038	-2.197945
group5	-1.69384	.0463853	-36.52	0.000	-1.785248	-1.602433
group6	-1.188505	.0438993	-27.07	0.000	-1.275013	-1.101997
group7	-.7768576	.0437807	-17.74	0.000	-.8631323	-.6905829
group8	-3.46686	.0484164	-71.61	0.000	-3.562269	-3.37145
group9	-1.689271	.0465569	-36.28	0.000	-1.781016	-1.597525
group10	.3483256	.0396782	8.78	0.000	.2701353	.4265158
time1	-.2679353	.063664	-4.21	0.000	-.3933924	-.1424783
time2	-.2357688	.0637377	-3.70	0.000	-.361371	-.1101666
time3	-.153543	.0636874	-2.41	0.017	-.279046	-.0280399
time4	-.0674498	.0638308	-1.06	0.292	-.1932354	.0583359
time6	.0920714	.0636845	1.45	0.150	-.0334261	.2175688
time7	.1507055	.0639311	2.36	0.019	.0247222	.2766888
time8	.1892609	.0636749	2.97	0.003	.0637824	.3147394
time9	.191073	.0636923	3.00	0.003	.0655602	.3165858
time10	.2233836	.063667	3.51	0.001	.0979206	.3488466
time11	.2619035	.0636796	4.11	0.000	.1364157	.3873912
time12	.2694011	.0636646	4.23	0.000	.143943	.3948591
time13	.2856765	.0636791	4.49	0.000	.1601898	.4111631
time14	.3097261	.0636647	4.86	0.000	.1842678	.4351845
time15	.2926122	.0637251	4.59	0.000	.1670348	.4181895
time16	.298192	.0637055	4.68	0.000	.1726533	.4237307
time17	.2932174	.0637528	4.60	0.000	.1675855	.4188493
time18	.3150287	.063777	4.94	0.000	.1893489	.4407084
time19	.3610519	.0637135	5.67	0.000	.2354974	.4866065
time20	.3479962	.0636853	5.46	0.000	.2224972	.4734952
time21	.3718841	.0637043	5.84	0.000	.2463477	.4974205
time22	.3825772	.0637387	6.00	0.000	.2569729	.5081815
time23	.3012685	.0637115	4.73	0.000	.175718	.4268191
time24	.2839305	.0639094	4.44	0.000	.1579899	.4098712
time25	.3058049	.0643109	4.76	0.000	.1790732	.4325365
time26	.2164429	.06415	3.37	0.001	.0900282	.3428575
_cons	5.406983	.0608729	88.82	0.000	5.287026	5.52694

Table A4.6: Regression 2, alternative specification

Source	SS	df	MS		
				Number of obs =	260
				F(35, 224) =	539.69
Model	384.122073	35	10.9749164	Prob > F =	0.0000
Residual	4.55515313	224	.020335505	R-squared =	0.9883
				Adj R-squared =	0.9864
Total	388.677226	259	1.50068427	Root MSE =	.1426

lnPriceTotal	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnPriceChina	.0235512	.0307887	0.76	0.445	-.0371213	.0842237
group1	.4757703	.0407955	11.66	0.000	.3953782	.5561624
group2	-.3714789	.0410557	-9.05	0.000	-.4523837	-.2905741
group4	-2.286965	.0587082	-38.95	0.000	-2.402656	-2.171274
group5	-1.691788	.0561142	-30.15	0.000	-1.802367	-1.581208
group6	-1.19163	.046884	-25.42	0.000	-1.28402	-1.09924
group7	-.7787538	.0475339	-16.38	0.000	-.8724245	-.6850831
group8	-3.456635	.0686374	-50.36	0.000	-3.591892	-3.321377
group9	-1.687016	.056656	-29.78	0.000	-1.798663	-1.57537
group10	.3463037	.0396928	8.72	0.000	.2680846	.4245228
time1	-.2628924	.0641222	-4.10	0.000	-.3892524	-.1365324
time2	-.2281001	.0639981	-3.56	0.000	-.3542156	-.1019847
time3	-.1519922	.0639436	-2.38	0.018	-.2780001	-.0259842
time4	-.0679575	.0640909	-1.06	0.290	-.1942557	.0583407
time6	.0911183	.0638816	1.43	0.155	-.0347675	.2170041
time7	.1527883	.0640724	2.38	0.018	.0265265	.2790501
time8	.1912744	.0637793	3.00	0.003	.0655903	.3169586
time9	.1897812	.0639384	2.97	0.003	.0637835	.3157789
time10	.2211587	.0638902	3.46	0.001	.0952559	.3470615
time11	.2584501	.0638177	4.05	0.000	.1326903	.3842099
time12	.2661345	.0638912	4.17	0.000	.1402297	.3920392
time13	.282571	.0638036	4.43	0.000	.1568389	.4083032
time14	.307121	.0638896	4.81	0.000	.1812195	.4330226
time15	.2915726	.0640202	4.55	0.000	.1654136	.4177316
time16	.2967864	.0639971	4.64	0.000	.1706729	.4228999
time17	.2921402	.0641078	4.56	0.000	.1658087	.4184717
time18	.3135578	.0642382	4.88	0.000	.1869694	.4401462
time19	.3587471	.0641397	5.59	0.000	.2323526	.4851415
time20	.3450089	.0640959	5.38	0.000	.2187009	.471317
time21	.3687154	.0642247	5.74	0.000	.2421536	.4952773
time22	.3802262	.0642464	5.92	0.000	.2536216	.5068309
time23	.3003268	.063968	4.69	0.000	.1742709	.4263828
time24	.2860466	.0640339	4.47	0.000	.1598606	.4122326
time25	.3108129	.0641933	4.84	0.000	.184313	.4373129
time26	.2214541	.0640077	3.46	0.001	.0953199	.3475883
_cons	5.329282	.1581576	33.70	0.000	5.017615	5.640949

Table A4.7: Regression 3, alternative specification, lagged

Source	SS	df	MS		
Model	384.112112	35	10.9746318	Number of obs =	260
Residual	4.56511395	224	.020379973	F(35, 224) =	538.50
Total	388.677226	259	1.50068427	Prob > F =	0.0000
				R-squared =	0.9883
				Adj R-squared =	0.9864
				Root MSE =	.14276

lnPriceTotal	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
laggedPric~a	.0000689	.0002233	0.31	0.758	-.0003712	.000509
group1	.478698	.0424518	11.28	0.000	.3950421	.562354
group2	-.3770036	.0406957	-9.26	0.000	-.4571989	-.2968082
group4	-2.312925	.0460116	-50.27	0.000	-2.403596	-2.222254
group5	-1.715325	.0454991	-37.70	0.000	-1.804986	-1.625663
group6	-1.205518	.0432549	-27.87	0.000	-1.290756	-1.120279
group7	-.7935223	.043294	-18.33	0.000	-.8788379	-.7082066
group8	-3.491529	.0473637	-73.72	0.000	-3.584865	-3.398194
group9	-1.711021	.0456825	-37.45	0.000	-1.801043	-1.620998
group10	.3444585	.0396629	8.68	0.000	.2662983	.4226187
time1	-.264036	.065124	-4.05	0.000	-.39237	-.1357019
time2	-.2336142	.0640091	-3.65	0.000	-.3597513	-.1074771
time3	-.1579442	.0643122	-2.46	0.015	-.2846786	-.0312098
time4	-.0737268	.06391	-1.15	0.250	-.1996686	.052215
time6	.0925199	.0640131	1.45	0.150	-.033625	.2186648
time7	.1555753	.0641524	2.43	0.016	.0291558	.2819948
time8	.1873824	.0647096	2.90	0.004	.059865	.3148998
time9	.1914851	.0641107	2.99	0.003	.0651478	.3178223
time10	.22208	.0641811	3.46	0.001	.095604	.348556
time11	.2586307	.0640617	4.04	0.000	.13239	.3848714
time12	.2680985	.0639253	4.19	0.000	.1421265	.3940705
time13	.2827086	.0639944	4.42	0.000	.1566005	.4088166
time14	.3090566	.0639267	4.83	0.000	.183082	.4350312
time15	.2943397	.0640349	4.60	0.000	.1681519	.4205276
time16	.2985679	.0642794	4.64	0.000	.1718983	.4252376
time17	.2949876	.0642236	4.59	0.000	.1684279	.4215474
time18	.3169723	.0643493	4.93	0.000	.1901649	.4437797
time19	.3613624	.0644054	5.61	0.000	.2344444	.4882805
time20	.3477001	.0642473	5.41	0.000	.2210937	.4743066
time21	.3725772	.0641556	5.81	0.000	.2461515	.4990029
time22	.3840347	.06422	5.98	0.000	.257482	.5105874
time23	.3017393	.0643149	4.69	0.000	.1749997	.4284789
time24	.2882555	.0642414	4.49	0.000	.1616606	.4148504
time25	.3132386	.0646702	4.84	0.000	.1857988	.4406784
time26	.2213662	.0653274	3.39	0.001	.0926314	.3501011
_cons	5.435602	.0582335	93.34	0.000	5.320846	5.550358

Appendix 5: Time series regressions

corrgram lncpi

```
                                          -1       0       1 -1       0       1
 LAG       AC       PAC      Q     Prob>Q  [Autocorrelation]  [Partial Autocor]
-------------------------------------------------------------------------------
1        0.8468   0.9010   20.881  0.0000          |------            |-------
2        0.7100  -0.4090   36.171  0.0000          |-----          ---|
3        0.5858   0.1442   47.032  0.0000          |----              |-
4        0.4714   0.3066   54.385  0.0000          |---               |--
5        0.3599  -0.0405   58.875  0.0000          |--                |
6        0.2527   0.0130   61.199  0.0000          |--                |
7        0.1559   0.0069    62.13  0.0000          |-                 |
8        0.0762   0.2410   62.365  0.0000          |                  |-
9        0.0092  -0.0077   62.368  0.0000          |                  |
10      -0.0494   0.3439   62.479  0.0000          |                  |--
11      -0.1023   0.0141   62.987  0.0000          |
```

Table A5.1: Prais-Winsten regression:

Dependent variable: lnCPI

Variable	Coefficient	Standard error	P>|t|
lnChinaShare	0.00128	0.0147	0.041
Time1980	-0.0742	0.0196	0.001
Time1985	-0.0080	0.0136	0.564
Time1990	0.0021	0.0140	0.88
Time1995	0.0130	0.0134	0.347
Time2000	0.0062	0.0134	0.648
Time2005	0.0081	0.0190	0.672
laggedCPI	0.0002	0.0001	0.000
Constant	3.3	0.1561	0.000
F(8,17)	178.2		
Durbin-Watson statistic (original)	0.92		
Durbin-Watson statistic (transformed)	1.46		
R^2 =0.988			