

DISCUSSION PAPER SERIES

No. 8544

**THE ARRIVAL OF CHEAP GOODS:
MEASURING THE IMPACT OF
CHINESE IMPORT COMPETITION ON
NORDIC PRICES**

Raphael Auer, Andreas M Fischer
and Andreas Kropf

INTERNATIONAL MACROECONOMICS



Centre for Economic Policy Research

www.cepr.org

Available online at:

www.cepr.org/pubs/dps/DP8544.asp

THE ARRIVAL OF CHEAP GOODS: MEASURING THE IMPACT OF CHINESE IMPORT COMPETITION ON NORDIC PRICES

Raphael Auer, Swiss National Bank
Andreas M Fischer, Swiss National Bank and CEPR
Andreas Kropf, Swiss National Bank

Discussion Paper No. 8544
August 2011

Centre for Economic Policy Research
77 Bastwick Street, London EC1V 3PZ, UK
Tel: (44 20) 7183 8801, Fax: (44 20) 7183 8820
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **INTERNATIONAL MACROECONOMICS**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Raphael Auer, Andreas M Fischer and Andreas Kropf

CEPR Discussion Paper No. 8544

August 2011

ABSTRACT

The arrival of cheap goods: Measuring the impact of Chinese import competition on Nordic prices*

What is the impact of Chinese import competition on Nordic producer prices? In a panel covering 23 (2 digit) NACE manufacturing sectors from 1995 to 2008, instrumental variable estimations predict that when Chinese imports capture a 1% increase in market share, Nordic producer prices decrease by about 2.0%. This China effect entails a drop of 14% in producer prices for the analyzed period.

JEL Classification: F11, F12, F14, F16 and F40

Keywords: comparative advantage, globalization and intra-industry trade

Raphael Auer
Dep. Head, International Trade and
Capital Flows
Swiss National Bank
Zurich DP
SWITZERLAND

Andreas M Fischer
Swiss National Bank
Börsenstrasse 15
8001 Zurich
SWITZERLAND

Email: raphael.auer@snb.ch

Email: andreas.fischer@snb.ch

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=167572

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=126190

Andreas Kropf
Swiss National Bank
Börsenstrasse 15
8001 Zurich
SWITZERLAND

Email: andreas.kropf@snb.ch

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=174102

* The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Swiss National Bank.

Submitted 12 August 2011

1. Introduction

Numerous studies have attempted to determine whether imports from China held down inflation in large countries such as Europe, Japan, or the United States.¹ It is well documented that China has had a significant presence in these larger markets for some time. Despite the observation that smaller countries tend to be more open to trade than the above mentioned countries, empirical studies have not rigorously examined whether Chinese import penetration has also dampened price growth in small open economies.

The Nordic region represents an exceptional case of Chinese import penetration for Europe. Among European regions, Chinese imports have captured the largest market share. The left-hand-side of Figure 1 plots the Chinese import share with respect to manufacturing output for three European regions: Nordic (i.e., Denmark, Finland, and Sweden), big European countries

¹Micro studies using 2- and 4-digit PPI and CPI data include Bugamelli et al. (2010) for Italy, WEO (2006) for Europe, Broda and Weinstein (2010) for Japan, and Wheeler for the UK. Borio and Filardo, (2007) and Pain et al. (2006) use conventional specifications of Phillips curves to determine the role of foreign output gaps on (aggregate) domestic inflation. A separate set of empirical studies including Auer and Fischer (2010), Gamber and Hung (2001), Ihrig et al. (2007), Kamin et al. (2008), and Tootell (1998) focus exclusively on the U.S. case.

(i.e., France, Germany, Italy, Spain, and the United Kingdom), and small European countries (i.e., Austria, Bulgaria, and Portugal). It shows that Chinese exports captured only 5% of the Nordic market share of non EU trade in 1995 and this percentage climbed steadily above 25% in 2010. This market share for the three Nordic countries lies above Europe's share for the five largest countries for most of the period. More importantly, this increase in Chinese market share has primarily come at the expense of U.S. exports. The right-hand-side of Figure 1 shows a near homogenous fall in U.S. export market share for the three European regions over a 14-year period. With this switch from high- to low-wage imports, we ask what is the impact of Chinese import competition on Nordic producer prices.

This note focuses strictly on manufacturing imports and documents that Chinese trade had a profound impact on Nordic inflation. In a panel covering 23 (2-digit) NACE rev. 1.1 manufacturing sectors from 1995 to 2008, the results show that when Chinese exporters capture 1% of Nordic market share, producer prices decrease about 2.0%. This result re-confirms the view that prices in small open economies are highly susceptible to the dampening effect of low-wage imports.

The empirical strategy assumes that Chinese trade is endogenous to do-

mestic demand. The IV strategy follows Auer and Fischer (2010) and is based on the observation that when Chinese manufacturing output grows, Chinese exports to the Nordic region increase in labor-intensive sectors relative to capital-intensive sectors. Chinese imports are heavily concentrated in labor-intensive industries. Regression analysis shows that this specialization also holds at the margin: for example, when China's manufacturing output rises, Chinese exports increase much more in labor-intensive sectors than in capital intensive sectors.

The note proceeds as follows: section 2 discusses the empirical framework and the data in the context of Chinese exports. Section 3 presents IV estimates of China's impact on (aggregate) Nordic producer prices. Section 4 offers concluding remarks on the effect of labor-intensive goods and their implications for prices in small open markets.

2. Empirical framework and data

The discussion of the empirical framework is presented in two subsections. The regression model and the IV strategy are discussed in subsection 2.1. Data description and sources are offered in subsection 2.2.

2.1 Empirical setup

The true relation between Nordic price changes and Chinese import changes is assumed to be specified as follows:

$$\Delta p_{j,t}^{NORD} = \alpha_j + \beta \Delta m_{j,t}^{CHN} + \epsilon_t + \epsilon_{j,t}, \quad (1)$$

where $p_{j,t}^{NORD}$ denotes Nordic prices at time t for sector j and $m_{j,t}^{CHN}$ denotes Nordic imports in sector j from China. The industry-specific trend of Nordic prices in sector j is captured by α_j , the common shock to Nordic prices at time t by ϵ_t , and sector specific price shocks by $\epsilon_{j,t}$. The absolute change in a variable is denoted by Δ .

In equation 1, the coefficient of interest, β , measures the true impact of an increase in Chinese trade on Nordic sectoral prices. A prior shared by most researchers is that Chinese imports lead to lower domestic prices, i.e., $\beta < 0$.

The term, the China effect, is used in many forms. It is thus important to be clear what the price effect stemming from an increase in China's market share is capturing in equation (1). The price effect stems from low-wage competition or in other words China's comparative advantage in low-skilled labor. This price effect excludes the efficiency gains from tariff changes, China's industrial policy, or exchange rate policy. The price effect also does not capture indirect effects arising from China's competition on exporters in

other countries or domestic producers. Further, equation (1) is not capturing improvements in retail chain management that are other linked with Chinese goods.

It is evident that trade is endogenous to local demand conditions in equation 1. To solve this endogeneity problem, Auer and Fischer (2010) observe that exports from low-wage countries (LWC) to markets in developed economies are primarily in labor-intensive sectors. And further, they document that the increase in exports is larger when aggregate LWC growth is high. In a similar manner, the instrument for $\Delta m_{j,t}^{CHN}$ is constructed by taking the interaction between Chinese (annual) growth of manufacturing output, g_t^{CHN} , and the sector's (average) labor intensity, $\bar{l}s_j$, yielding $g_t^{CHN} \bar{l}s_j$.

As in Auer and Fischer (2010), the preferred specification is a reduced form relation between labor intensity differentials and price differentials. This difference-in-difference specification relates Chinese growth changes times labor intensity to relative changes in prices

$$\begin{aligned} \Delta p_{j,t}^{NORD} - \Delta p_{k,t}^{NORD} = & \lambda_{1,j} + \lambda_{2,t} + \gamma (\bar{l}s_j - \bar{l}s_k) g_t^{CHN} \\ & + \rho(\Delta X_{j,t} - \Delta X_{k,t}) + \epsilon_{k,j,t}, \end{aligned} \quad (2)$$

where $\Delta p_{j,t}^{NORD} - \Delta p_{k,t}^{NORD}$ denotes the relative price between sector j and k , λ_1 and λ_2 are fixed and time effects, $(\bar{l}s_j - \bar{l}s_k) g_t^{CHN}$ measures import competition between two sectors, $\Delta X_{j,t}$ are control variables, and $\epsilon_{k,j,t}$ the error term. Fixed effects are introduced to filter out sector specific trends in prices. The variation that is exploited relates the difference in how imports change in sectors with different labor intensities to differences in sectoral price changes.

2.2 Data description

For the empirical analysis, we merge Nordic sector specific trade, domestic production, and producer price index (PPI) data classified in the NACE rev 1.1 system. To guarantee a reasonable number of observations the analysis considers only the aggregate of the three countries. The selection of these countries is based on data availability. All data are from Eurostat. While the domestic production data as well as the PPI data is available in NACE rev. 1.1 classification on Eurostat, the trade data has to be converted to NACE rev. 1.1 from CN8 using a correspondence table. Sample begin is based on the fact that a sufficient panel with all three data types mentioned above is available only from 1995 onwards. To exclude the world trade collapse

in 2009, we conduct our analysis for the years 1995-2008.² The quality of PPI data limits the analysis at the 2-digit NACE level, leaving us with 23 manufacturing sectors for most years.

The measure of import penetration is constructed in the following manner. We divide the value of Chinese imports by the value of domestic production plus world imports. To make sure that the results are not driven by the endogenous response of Nordic sales to Nordic price developments, the value of domestic production plus world imports is averaged over the full sample. Our measure of import penetration takes the value of 0.01 in a sector where Chinese imports amount to 1% of average Nordic sales in the respective sector.

When examining changes of import penetration, the absolute change in the level of import penetration is evaluated, i.e., import penetration at time t minus import penetration at $t-1$. This strategy is expedient, because the response of Nordic prices should be in relation to the increase of imports in proportion to Nordic demand but not in proportion to the percentage growth of Chinese imports. Further, normalizing by sector size in the Nordic region does not drop any zero-trade observations.

²Figure 1 shows that China's takeoff occurred only after 1995.

To measure an industry's labor intensity, the 1995 to 2008 average of the European labor expenditure share is used for each of the 23 sectors. Labor intensity is defined as the ratio of average labor expenditure divided by the average capital expenditure. Large European countries are used to define average labor expenditure. They are France, Germany, Italy, Sweden, and the United Kingdom. The intention is to define a European representative measure of sectoral labor share that is free of large variations in time and of country characteristics peculiar to the Nordic region.

3. Chinese imports and Nordic prices

We begin the discussion of the IV results with the first-stage regressions. These regressions are displayed in Panel A of Table 1. In each specification, the instrument passes several tests of weak identification. The Cragg-Donald statistics, the associated Stock-Yogo statistic, as well as the F-statistic from the first-stage regressions reveal that the criticism of weak instruments is not an issue. The same panel also shows that the variable, labor intensity multiplied by the change in Chinese industrial output, is significant at the 1% level.

The second-stage IV regressions show that the relative price effect is stable

in different specifications. These are presented in Panel B. Column 1 shows that the relative price effect is -2.0 and highly significant in the baseline regression with time dummies. This point estimate means that a 1% increase in Chinese import share is associated with a 2.0% fall in Nordic producer prices. Next, column 2 adds annual Chinese manufacturing output to the regression with fixed effects. This control variable is significant but it does not change the point estimate for import share. Column 3 introduces sectoral productivity and sectoral wages into the specification defined in column 2. Although productivity is found to be significant, again it has no bearing on the baseline estimate of -2.0 shown in column 1. The last two specifications in columns 4 and 5 that control for dynamics do not alter the baseline estimate.

When we observe that the market share of Chinese imports grows, this could stem from either more goods being imported at constant prices (the channel we want to isolate), or alternatively, the same quantity being imported at higher prices. To make sure that the first effect is captured, physical import volumes (measured in kilos) in the first-stage regressions are used instead of import values (measured in euros). Also the measure of physical import volumes is normalized by market size, which is measured in the same physical quantity as is the import volume. Estimates for Nordic prices and

their corresponding specifications as in Table 1 are shown in Table 2. In terms of the instrument's strength, the first-stage regressions show higher F-tests than the regressions with import values. The relative price effect remains highly significant but is now estimated to be around -0.8%.

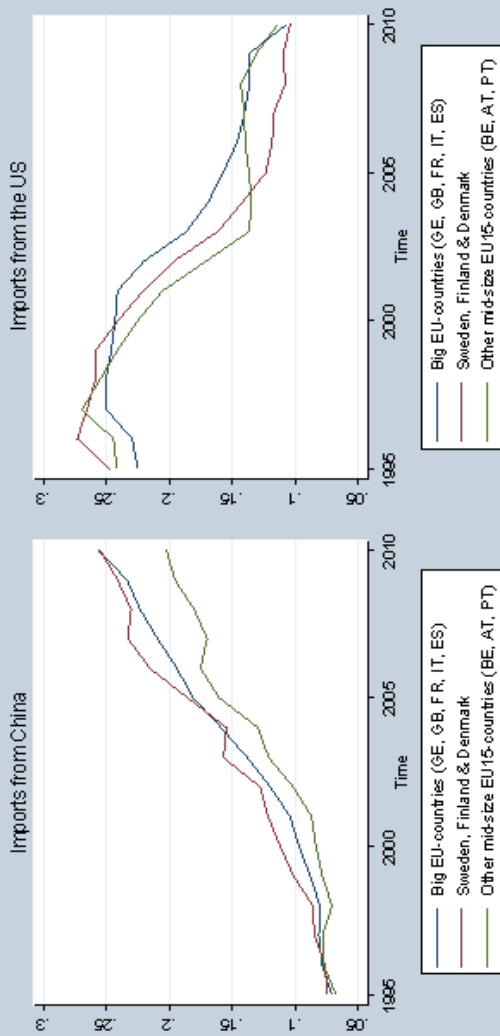
4. Conclusions

This note investigates how Chinese imports influence Nordic producer prices. In a panel covering 23 (2-digit) NACE manufacturing sectors from 1995 to 2008, the results show that Chinese trade has a strong impact on Nordic producer prices. When Chinese exporters capture 1% of Nordic market share, producer prices decrease about 2.0%. This China effect is about one-half as large when volume based-imports are used as a measure to account for exchange rate fluctuations. Because China gained a market share of 7% in the manufacturing sector over the analyzed period, the price effect translates into a 14% reduction in Nordic producer prices. The fact that China has steadily gained market share in the Nordic region and even during the financial crisis suggests that Chinese import competition will weigh more heavily in future monetary policy decisions.

References

- Auer, R. and A. M. Fischer, 2010. The effect of low-wage import competition on U.S. inflationary pressure, *Journal of Monetary Economics* 57(4), 491-503.
- Borio, C., and A. Filardo, 2007. Globalisation and inflation: new cross-country evidence on the global determinants of domestic inflation, BIS Working Paper 227. Basel: Bank for International Settlements, May.
- Broda, C., Weinstein, D. E., 2000. Exporting Deflation, Chinese Exports and Japanese Prices, NBER Chapters in China's Growing Role in World Trade, 203-227.
- Bugamelli, M., S. Fabiani, and E. Sette, 2010. The pro-competitive effect of imports from China: an analysis of firm level price data, *Temì di discussione* 737, Bank of Italy.
- Gamber, E. and J. H. Hung, 2001. Has the rise in globalization reduced U.S. inflation in the 1990s, *Economic Inquiry* 39(1), 58-73.
- Ihrig, J., S. B. Kamin, D. Lindner, and J. Marquez, 2007. Some simple tests of the globalization and inflation hypothesis, *International Finance Discussion Papers* 891. Washington: Board of Governors of the Federal Reserve System, April.
- Kamin, S. B., M. Marazzi, and J. W. Schindler, 2008. The impact of Chinese exports on global import prices, *Review of International Economics*, 14(2), 179-201.
- Tootell, G. M. B., 1998. Globalization and U.S. inflation, *New England Economic Review*, Federal Reserve Bank of Boston, July, 21-33.
- Wheeler, T., 2008. Has trade with China affected UK inflation?, *External MPC Unit Discussion Paper No 22*, Bank of England.
- World Economic Outlook, 2008. How has globalization affected inflation?, Chapter 3, 97-134.

Share of US- & China-Imports on all Outside-EU15-Imports



Datasource: Eurostat

Table 1 - China Import Value (in €) and Nordic Prices: IV Results (Fixed Effects Panel Estimations)

Specification	(1) with year dummies	(2) incl. China Ind. Growth	(3) incl. China Ind. Growth / Productivity & Wages	(4) Lagged Prices	(5) Lagged Ch. Imports LWC
Panel B: IV Second Stage Estimation - Dep. Var. is the y/y Ln-change in Producer Prices					
Ch. Imports China (in % of European Industry Size)	-1.978*** [0.871]	-2.016*** [0.988]	-2.043** [1.049]	-1.970*** [0.918]	-2.040*** [0.856]
Ch. % China Manufacturing Output	0.329*** [0.076]	0.319*** [0.076]	0.319*** [0.076]		
Productivity		0.000*** [0.000]	0.000*** [0.000]		
Wages		0.000 [0.000]	0.000 [0.000]		
Lag of Producer Prices			0.030 [0.055]		
Lag of Ch. Imports China					-0.410*** [0.178]
Panel A: IV First Stage Estimation - Dep. Var. is the y/y change in (China Import Value in € / European¹ industry Size)					
Labor Intensity * Ch. % China Manifct. Output	0.024*** [0.007]	0.024*** [0.007]	0.022*** [0.007]	0.024*** [0.007]	0.024*** [0.007]
Ch. % China Manufacturing Output	-0.061*** [0.029]	-0.061*** [0.029]	-0.058* [0.030]		
Productivity		-0.000 [0.000]	-0.000 [0.000]		
Wages		0.000 [0.000]	0.000 [0.000]		
Lag of Producer Prices			0.003 [0.008]		-0.196*** [0.036]
Lag of Ch. Imports China					
Cragg-Donald Statistic	10.78	10.32	9.483	9.686	12.05
Max Reject Stock-Yogo Crit Value	15%	15%	15%	15%	15%
Level					
1 st stage F-statistic	5.150	12.30	12.25	2.498	2.874
Year dummies (both stages)	y	n	n	y	y
Observations	713	713	629	671	671
Groups (Destination - NACE)	63	63	63	63	63
R-Square (first stage within)	0.0825	0.0422	0.0510	0.0800	0.196

Notes: ¹ Nordic is Sweden, Finland, and Denmark. Panel B displays two-stage least squares estimations. The dependent variable is the annual change in the logarithm of the producer price at the 2-digit NACE (Rev. 1.1) level (only manufacturing industries). "Ch. Imports China" is defined as the y/y absolute change in (China import value in €/European industry size). The industry size is defined as the 1995-2008 average value of European domestic production plus world imports. In columns 2 and 3, "Ch. % China Manufacturing Output" is the growth rate of manufacturing output in China. Productivity is the wage-adjusted labor productivity and wages capture wages and salaries. Column 4 includes lagged producer price changes and column 5 incorporates lagged changes of Chinese import values. In Panel A the first-stage relation is displayed. The instrument is the sector's labor intensity times "Ch. % China Manufacturing Output". All estimations include fixed effects by sector. Clustered standard errors (by country) reported in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 2 - China Import Volume (in kilograms) and Nordic Prices: IV Results (Fixed Effects Panel Estimations)

Specification	(1) with year dummies	(2) incl. China Ind. Growth	(3) incl. China Ind. Growth / Productivity & Wages	(4) Lagged Prices	(5) Lagged Ch. Imports LWC
Panel B: IV Second Stage Estimation - Dep. Var. is the y/y Ln-change in Producer Prices					
Ch. Imports China (in % of European Industry Size)	-0.815*** [0.290]	-0.802** [0.340]	-0.714** [0.350]	-0.793*** [0.291]	-0.741** [0.292]
Ch. % China Manufacturing		0.395*** [0.089]	0.333*** [0.089]		
Output			0.000*** [0.000]		
Productivity			0.000*** [0.000]		
Wages			0.000*** [0.000]		
Lag of Producer Prices			0.021 [0.058]		
Lag of Ch. Imports China					-0.141 [0.120]
Panel A: IV First Stage Estimation - Dep. Var. is the y/y change in (China Import Volume in kilograms / European¹ industry Size)					
Labor Intensity * Ch. % China	0.062*** [0.022]	0.062*** [0.021]	0.058*** [0.020]	0.063*** [0.022]	0.063*** [0.024]
Manufact. Output		-0.100 [0.090]	-0.127 [0.102]		
Ch. % China Manufacturing			-0.000 [0.000]		
Output			0.000* [0.000]		
Productivity			0.000* [0.000]		
Wages			0.000* [0.000]		
Lag of Producer Prices				-0.029 [0.020]	
Lag of Ch. Imports China					-0.056 [0.161]
Cragg-Donald Statistic	14.11	12.99	13.58	13.47	14.78
Max Reject Stock-Yogo Crit Value	15%	15%	15%	15%	15%
Level					
1 st stage F-statistic	7.861	13.44	14.63	3.962	4.819
Year dummies (both stages)	y	n	n	y	y
Observations	613	613	538	575	577
Groups (Destination - NACE)	55	55	55	55	55
R-Square (first stage within)	0.157	0.0867	0.136	0.156	0.158

Notes: ¹ Nordic is Sweden, Finland, and Denmark. Panel B displays two-stage least squares estimations. The dependent variable is the annual change in the logarithm of the producer price at the 2-digit NACE (Rev. 1.1) level (only manufacturing industries). "Ch. Imports China" is defined as the y/y absolute change in China import volume in kg/European industry size. The industry size is defined as the 1995-2008 average value of European domestic production plus world imports. In columns 2 and 3, "Ch. % China Manufacturing Output" is the growth rate of manufacturing output in China. Productivity is the wage-adjusted labor productivity and wages capture wages and salaries. Column 4 includes lagged producer price changes and column 5 incorporates lagged changes of Chinese import volumes. In Panel A the first-stage relation is displayed. The instrument is the sector's labor intensity times "Ch. % China Manufacturing Output". All estimations include fixed effects by sector. Clustered standard errors (by country) reported in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%.