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THE IMPACT OF CHINA ON MANUFACTURING EXPORTS  
OF ITALY AND GERMANY

Giorgia Giovannetti, Marco Sanfilippo and Margherita Velucchi



**EUROPEAN UNIVERSITY INSTITUTE, FLORENCE**  
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**GLOBAL GOVERNANCE PROGRAMME**

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**GIORGIA GIOVANNETTI, MARCO SANFILIPPO AND MARGHERITA VELUCCHI**

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## **Abstract**

This paper analyses the impact of China on the export performance of Italy and Germany to their main trading partners in the OECD markets. Given a strong specialization in the manufacturing sector, these two countries are exposed to China's competition. Italy, with a productive structure based on so-called "traditional" sectors, is likely to be more vulnerable to China's competitive pressure. Using data for the period 1995-2009, this paper estimates the impact of China on Italy and Germany's market shares at a very disaggregated sector level. Results show that China has affected Italy's and Germany's market shares in different ways, especially during the post-WTO accession period, being on average more harmful for the former.

## **Keywords**

China; Gravity Model; Market Shares

**JEL Classification:** F-10; F-14



## **1. Introduction\***

The rapid growth and international integration of China in the last thirty years has modified the power balance of world trade. Having gone through a rapid process of structural transformation as well as international integration, while increasing its shares, China has also been upgrading the quality of its production and exports.

Since its early opening to international markets in 1978, China has been characterized by its capacity to supply large quantities of low cost manufactures. Over time, China has substantially increased the range of products that it exports. Analyses based on highly disaggregated statistics on trade (at the 6-digit of the Harmonized System) show that China exports as many products as Germany, which is the country exporting the greatest number of products worldwide (Schott, 2004).

China started with a cautious approach to foreign trade, marked by tight controls on foreign-trade regime, import substitution and an overvalued exchange rate. Liberalizations occurred before and after the definitive admission of China to WTO of December 2001. The trade surge that followed WTO-accession has been characterized by a change in the export structure across the manufacturing sector. As it had already happened to other developing countries, especially in East Asia, there is evidence of a reallocation of traditional Chinese exports (namely footwear, textiles, and toys) towards more sophisticated categories of products, with a growing relevance of machinery and transport equipment. These changes in China's export structure have been the focus of recent research, aiming at understanding on the one hand whether they can be considered exceptional for a country still at an "early stage" of economic development and, on the other hand, which factors have mostly contributed to this structural change. A relevant issue emerging from this recent research is whether the competitive threat from China is affecting not only developing but also developed countries and not only labour intensive but also capital-intensive goods.

Against this background, this paper analyses the impact of China on the market performance of two of the most relevant manufacturing exporters, Italy and Germany, characterized by a rising similarity in export structure with China. Italy, given its specialization in low technology manufacturing products, is nonetheless more likely to be at risk from China's competition than Germany, which has recently been able to significantly upgrade its export structure.

The paper proceeds as follows. Section 2 briefly reviews the existing literature on China's export sophistication and changing comparative advantages. Section 3 analyses the impact of China on other countries' export performance. Section 4 specifies the econometric model, describes data, methodology and results. Section 5 concludes, summarizing the main findings.

## **2. Export sophistication and the evolving nature of China's comparative advantages**

The pioneering study of Lall and Albaladejo (2004) has shown that, starting in the nineties, Chinese exports have slowly moved from traditional low- technology specialization to medium and high-technology productions, drawing particularly on technology transfer from foreign multinational enterprises (MNEs) and high spending in research and development (R&D). Rodrik (2006) is the first to show how Chinese exports have become relatively more sophisticated since 1992 and that, in 2003,

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\* We wish to thank participants to the workshop "The Chinese Economy", organized by the Bank of Italy, November 2010; to a seminar at the Vienna Institute for International Economic Studies (Wiiw), June 2011; to the annual conference of the Chinese Economic Association in Dublin, July 2011; to the European Economic Association Meeting in Oslo, August 2011 and to the Royal Economic Society Annual Conference in Cambridge, March 2012, for their comments on earlier versions of the paper.

the export structure of the country was more similar to that of a country with an income per capita three times higher than the Chinese one.<sup>1</sup> The so-called “China is special” argument proposed by Rodrik has been confirmed in two recent studies by Schott (2008) and Fontagné et al. (2008). Both studies measure export sophistication by means of unit values. Schott (2008), with an analysis up to ten-digit disaggregated data on US and using an export similarity index, shows that Chinese exports are becoming increasingly similar to those of OECD countries. Nonetheless, on the basis of unit values, he also shows that Chinese products are still lagging behind OECD countries in terms of quality, especially in the machinery sector and in manufacturing materials. A similar conclusion is reached by Fontagné et al. (2008), which, using data on the unit value of exports, find that, the similarity between the north (EU) and the south (China) decreases, when more disaggregated data and market shares at the product level are considered. This suggests that northern countries still maintain a higher specialization on a cross varieties within the same products. This view has been recently challenged in a paper by Pula and Santàbarbara (2011), criticizing the use of unit values as a proxy of quality in the case of China. They claim that unit values do not take into account tariffs, taxes and distribution mark-ups, all having an impact on the final price of the product but not on its quality. Indeed, in case taxes are higher, Chinese companies have to sell their products at lower values to be competitive. Furthermore, production costs and exchange rates have an impact on final prices, widening the gap with quality. Pula and Santàbarbara (2011) estimate the quality of Chinese exports to Europe by adding information on market shares and find that, despite the lower unit values, the quality of Chinese exports is higher compared to other developing countries.

Objecting to the hypothesis of export sophistication, a strand of the literature emphasizes the importance of processing trade (Xu and Lu, 2009; Amiti and Freund, 2010; Mayneris and Poncet, 2010) claiming that analyses focusing on China’s export upgrading (e.g. Schott, 2008) tended to neglect the role of imports and especially imported inputs. Similarly, the prominent role of foreign invested enterprises (FIEs) affects significantly the structure of Chinese exports. Dean et al. (2007) show that they account for about 30 to 50% of Chinese exports, especially in technologically advanced sector<sup>2</sup>.

Vaidya et al. (2007) find evidence of rising comparative advantages for high-tech products, adopting the OECD technological taxonomy to classify Chinese exports by sectors and using the Balassa index<sup>3</sup>. This increase in revealed comparative advantages is consistent with two additional facts: the growing share of these sectors in international markets and the positive trade balance of China in the same sectors. On the whole, according to the authors, this pattern of specialization sees China keeping its competitive advantage in low-tech productions and gaining an advantage in end-of-the-spectrum productions in high-tech sectors. This last point is confirmed by a detailed study on the electronics sector (Van Assche and Ganges, 2007) showing that Chinese exports have a comparative advantage consistent with the country’s level of development (measured by the GDP per capita), since it lies in the lowest value added products. Other analyses, however, have shown that, rather than a real shift in the nature of comparative advantage, China is currently experiencing an increase in the number of sectors where it enjoys a comparative advantage (Qureshi and Wan, 2008; Shafaeddin and Pizarro, 2010). As a matter of fact, most authors seem to reject the assumption of an absolute upgrade in the structure of comparative advantages of China (Branstetter and Lardy, 2006; Naughton, 2007).

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<sup>1</sup> The work of Rodrik is based on the export sophistication indicator EXPY that had been developed by the same author together with Hausman and Hwang (Hausman et al., 2007).

<sup>2</sup> A more detailed analysis based on input/output tables by Koopman et al. (2008), finds that the domestic value added is lower than 50% in more sophisticated sectors that accounted for 44% of total exports in 2002; 50-65% in 15 sectors (especially labor intensive such as toys, arts & craft manufacturing) that account for 22% of total exports and prevalent in the remaining 33 sectors that account for one third of total exports (especially the apparel).

<sup>3</sup> High tech products as a group, moved from 0.7 in 1987 to 2.16 in 2006 driven by automatic data processing equipment; telecommunication equipment and optical instruments

### **3. The impact of Chinese exports on other countries' exports**

China's sustained pattern of economic growth over the last three decades has influenced other economies in the world through a number of different channels, with trade being the most significant one (Arora and Vamvakidis, 2010). Following China's entry into the WTO in 2001, a stream of the literature has investigated the possible impact on trade performance of different groups of countries (Shafaeddin, 2002; Yang, 2006). This line of thought mainly focused on East Asia, given the crucial role of China in the re-organization of regional production networks that resulted in China specializing on assembling intermediate products from the neighbor countries (Gaulier et al., 2006). There is evidence that the upgrading of Chinese exports and the consequent changes in its trade specialization threatened both the "mature tigers" and the "new tigers" in more advanced segments of production (Lall and Albaladejo, 2004; Eichengreen et al., 2004; Greenaway et al., 2008). Recently, some contributions analyzed the impact of China on other developing countries in Latin America (Jenkins et al., 2008) and Africa (Giovannetti and Sanfilippo, 2009) finding evidence of displacement, at least in some destination markets.

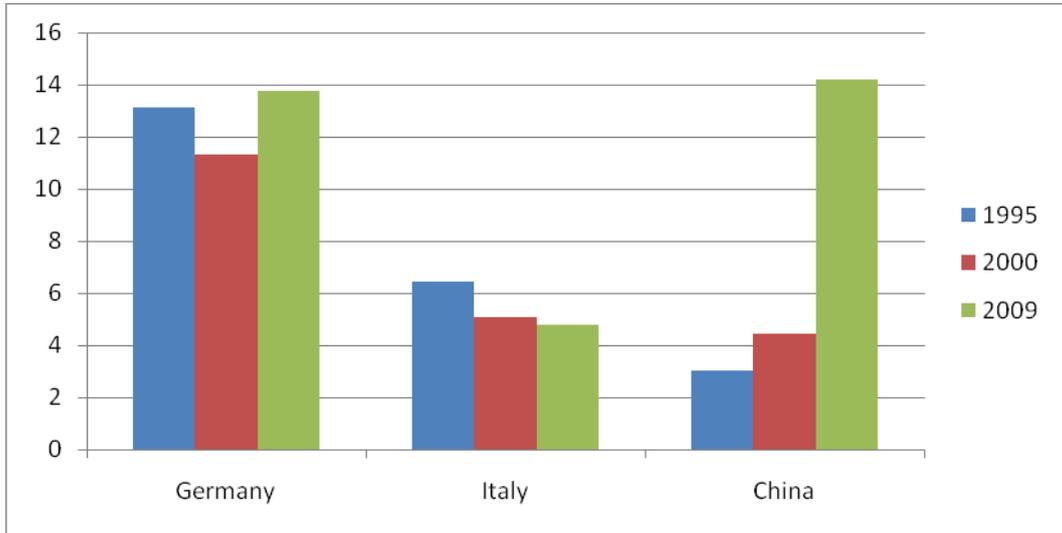
Little attention has been given so far to the possible impact of Chinese export on developed countries, whose productive structures were considered less at risk due to their relatively more sophisticated production. However, some developed countries might be considered "at risk" because of their specialization in manufacturing.

A detailed analysis by Chepeta et al (2010) points to the heterogeneity of developments within industrial countries (EU, US and Japan) and among sectors against the rise of Chinese market shares. They show that, on average, EU countries have performed better than US and Japan. A similar conclusion has been reached by Husted and Nishioka (2010), who estimated China competition by means of a constant market shares analysis. Nonetheless, Chepeta et al. (2010) also show that, within EU, market shares have been characterized by different behaviors: while German market shares have been more or less constant, Italian ones have dropped substantially, even though with differences across sectors and products. Italy represents an interesting case because its productive structure is based on so-called "traditional" sectors, i.e. those less intensive in technology and skilled labor. The overlap between Chinese and Italian trade specializations has been growing considerably over the period 1991-2001, especially in low skilled but also in some skill intensive sectors (Amighini and Chiarlone, 2005). A recent analysis based on export similarity indexes shows how, outside the Asian region, Italy is the country with the most similar export structure to China, followed by Germany (ICE-Prometeia, 2011). The same study shows that, in the case of Germany, an interesting and somewhat unexpected issue is that its similarity with China increased substantially over the last decade.

As mentioned above, China has increased the number of sectors where it enjoys a comparative advantage, achieving a considerable gain also in sectors, such as more advanced intermediate goods. This has favoured a rapid increase of Chinese shares on global markets, and a catching-up on developed countries to become, in 2009, the first world exporter.

The remarkable increase of Chinese export shares in OECD markets is shown, for the case of manufacturing, in Figure 1. The figure also suggests that German market shares have proven fairly stable over time, slightly increasing over the last decade despite the rapid growth of China.

**Figure 1. Manufacturing Export shares (%) of selected countries in OECD markets**



Source: Authors' elaboration on UN Comtrade data accessed via WITS

The export structures of Italy and Germany have some similarities in the groups including intermediate and capital goods. Italy, however, is more specialized in non-durables consumer goods, while Germany is specialized in consumer durables. Italy's specialization in such low skilled production, whose world demand has been growing less than the world average in the last decade, has been often used to explain the country's loss of world's market shares over the last twenty years (Barba Navaretti et al, 2008). Germany, on the other hand, has well performed over the last decade thanks to its capacity to move to higher quality productions, which have partially sheltered the country from low cost competition of emerging countries.

Understanding to what extent such broad trends in manufacturing market shares are reflected in the different sectors is the object of the remaining paragraphs.

## 4. The Model

### 4.1 The empirical analysis

In this paper, we estimate a gravity model on bilateral trade to analyse the dynamics of competition between Chinese, Italian and German exports.

Gravity models have been recently widely used to explain international trade dynamics. To measure the effect of Chinese export on other countries' exports, however, gravity models have been augmented, by including Chinese exports to the same markets among the independent variables, thus controlling for possible competitive effects (Eichengreen et al., 2004; Greenaway et al., 2008).

We develop a model along the lines of Eichengreen et al. (2004), to identify whether and how the two main EU manufacturing exporters are displaced on their main destination markets, OECD countries, by Chinese exports:

$$X_{i,j,z,t} = C + \beta_1 CH\_EXP_{j,z,t} + \beta_2 GDP_{i,t} + \beta_3 GDP_{j,t} + \beta_4 T_j + e_{i,j,z,t} \quad (1)$$

Where  $X_{i,j,z,t}$  represents the value of exports of country  $i$  to country  $j$  in product  $z$  in year  $t$ .  $GDP_{i,t}$  and  $GDP_{j,t}$  represent the GDP and GDP per capita levels of the importer at time  $t$ ,  $T_j$  is a country and time invariant set of variables including factors that may favour or limit trade flows at time  $t$ : bilateral distance between the exporter and the importers, lack of access to sea, common boundaries and common language between the exporter and the importer. Finally,  $CH\_EXP_{j,z,t}$  represents the value of Chinese exports to country  $j$  in sector  $z$  in year  $t$ . A negative sign of the coefficient of this variable (and its statistical significance) indicates an inverse relationship, suggesting a substitution effect (everything else being equal). However, considering the effects of China's exports on another country exports could hinder the extent to which this represents a pure competitive effect. A reduction in a country's exports in correspondence to an increase in Chinese exports might not translate in a loss of market power in a context where, for instance, both exports have risen, but Chinese ones have been increasing faster.

In light of this possible drawback, we modified model (1) by using market shares instead of export values, with the aim of providing a more precise answer to the question of how much the rise of Chinese market shares in OECD countries observed in Figure 1 has been at the expenses of traditional exporters such as Italy and Germany within the most relevant sectors of manufacturing. Our final specification is therefore the following:

$$SHARE_{i,j,z,t} = C + \sum_{s=1}^k SHARE_{i,j,z,t-s} + \beta_1 SHARE\_CH_{j,z,t} + \beta_2 GDP_{p,t} + \beta_3 GDP\_PC_{j,t} + \beta_4 T_j + \beta_5 UV_{i,j,z,t} + e_{i,j,z,t} \quad (2)$$

Where  $SHARE_{i,j,z,t}$  is the market share of country  $i$  ( $i$  =Italy, Germany) in country  $j$  (one of the OECD importers) in product  $z$  (at 6-digit of HS) in year  $t$  and  $SHARE\_CH_{j,z,t}$  is the corresponding share held by China in country  $j$ , sector  $z$  and year  $t$ . A negative sign of the coefficient  $SHARE\_CH$  means that a gain of China's market shares has been at the expenses of country's  $i$  share, while a positive sign or a not significant coefficient represents a situation where there is not direct competition. In this case, a rise of China has not led to shrinking market opportunities for Italy or Germany. Compared to (1), we include also the  $k$  higher order lagged market shares of country  $i$ , derived by its autocorrelation function<sup>4</sup>.

The long time span of our sample, which includes information from mid-nineties to 2009, may hinder some heterogeneity in the way the China effect has been spread across the two countries and the different sectors. This is indeed a very peculiar period during which China has strongly liberalized its external sector and has undergone severe reforms to be admitted to the WTO. We maintain that, though some form of competitive pressure – especially in low tech sectors – certainly existed already during the 1990s, the competitiveness of China has increased and with it the possible impact on other countries' export performance as a consequence of the country's accession to WTO. From an econometric point of view, the structural stability of the parameters of interest may be undermined by the existence of a structural break in the series, assuming that both the intercept and the slopes of the parameters may change over different periods. When – as in this case – the point of structural break is known a priori (i.e. 2001), a Chow test of stability of the parameters can be performed (Baum, 2006). The test statistics computed on the variable  $SHARE\_CH_{j,z,t}$  is highly significant ( $p < 0.001$ ) suggesting a statistically different effect across the two periods. Hence, we run our model taking into account the periods of pre- and post-WTO accession. This is done by introducing in (2) two interactions of the variable  $SHARE\_CH$ : one with a time trend dummy covering the period 1995-2000 and the other with a dummy covering the years 2001-2009.

<sup>4</sup>  $K$  may vary substantially across sectors and between Germany and Italy since their autocorrelation functions are very different and represent the time relationships within the variables. For space reasons we did not include all autocorrelation functions in the paper but they are available from authors upon request.

Finally, we add an additional variable,  $UV_{i,j,z,t}$ , representing the unit value of export of product  $z$  to market  $j$  at time  $t$ , with the objective of accounting for a possible quality upgrading strategy.

Panel models in this gravity context have been often estimated in the literature adopting a two stage least square method with instrumental variables to address the issue of endogeneity arising from the fact that external shocks affecting one country exports could also affect China's exports and vice versa (Wooldridge, 2002; Eichengreen et al., 2004; Greenaway et al., 2008). The methodology adopted to estimate our model is slightly different. Indeed, the inclusion of the *SHARE* lagged values introduces endogeneity and autocorrelation, due to the fact that both the dependent and the lagged variable depend on the same fixed component of the error term, giving rise to the so-called "dynamic panel bias" (Roodman, 2006). To deal with this problem, we adopt a dynamic panel data model based on the Arellano-Bond/Blundell-Bover GMM estimator. This allows us to overcome the above mentioned problems by instrumenting level variables with predetermined variables first differences and higher order lags, if necessary. Higher order lag might not be ideal instruments, since it is possible to have common shocks on market shares that are correlated over time, in which case the lagged variables would be correlated with the current period market share. However, common shocks correlated over time are conceptually similar to trends; hence, a suitable control for correlated market share shocks and/or trends may alleviate autocorrelation and endogeneity problems in the GMM estimator. Also, when possible, in order to avoid concern about a high instrument number in the estimation procedure, we used a collapsed instrument set comprised of only lower order lags; this approach was deemed appropriate as it has been shown to produce more reliable results in scenarios where the instrument count is on the higher side (Mehrhoff, 2009)

Our panel structure includes country-sector pairs as fixed effects to take into account for unobserved characteristics, and time dummies are included in all the specifications as suggested by Roodman (2006).

The dataset covers the period 1995-2009; OECD countries are the importers. All monetary variables are in natural logarithm (see Table 1 for summary statistics). Data on market shares are computed on bilateral trade flows classified according to the harmonized system (1992) at 6-digit level and come from the BACI dataset published by CEPII (cf. Gaulier and Zignago, 2010). Keeping the high level of disaggregation to account for product specific characteristics, we run the model adopting the grouping structure of the Standard International Trade Classification (SITC) revision 3. Bilateral distances, measured as simple distance (in Km) between the two most populated cities, comes from the CEPII, as well as the dummies indicating the lack of access to the sea and the territorial contiguity between the exporter and the importer (Mayer and Zignago, 2011). Data on GDPs of the exporter and the importers are from the World Bank World Development Indicators.

**Table 1. Summary Statistics, Italy and Germany datasets**

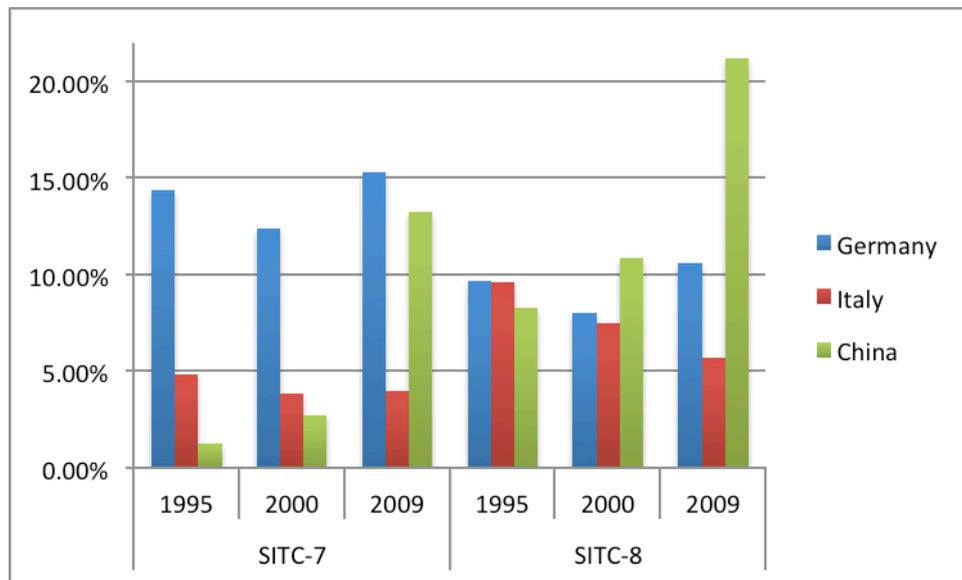
Variable	Obs	Mean	Std. Dev.	Min	Max
share_it	1289505	0.084	0.149	0	1
lgdp	1289505	27.047	1.416	22.672	30.296
lgdp_pc	1289505	10.259	0.429	8.918	11.457
ldist	1289505	7.725	1.082	5.330	9.829
landlocked	1289505	0.099	0.299	0	1
comlang_off	1289505	0.051	0.219	0	1
contig	1289505	0.154	0.361	0	1
share_ch	1289505	0.091	0.176	0	1
luv_it	1081160	2.419	1.764	-12.167	17.374
share_de	1408200	0.163	0.208	0	1
lgdp	1408200	26.959	1.428	22.672	30.296
lgdp_pc	1408200	10.265	0.427	8.918	11.457
ldist	1408200	7.351	1.283	5.156	9.843
landlocked	1408200	0.100	0.300	0	1
comlang_off	1408200	0.100	0.300	0	1
contig	1408200	0.248	0.432	0	1
share_ch	1408200	0.083	0.171	0	1
luv_de	1247677	2.323	1.836	-12.196	19.025

## 4.2 Results

In what follows, we exploit the wide sectoral dimension of our dataset by providing results for sub-sectors within the manufacturing and especially by running model (2) for Italy and Germany for the divisions included under the SITC-7 and SITC-8. As remarked at the beginning of this paper and shown also in Figure 2, it is well known that China is a leader exporter in consumption goods (SITC-8). However, its competitive strength is also rapidly spreading to more capital intensive and other higher value added industries, which are mainly included in SITC-7.

If we look at the trends in market shares of Germany, Italy and China in the OECD markets, we can see that, in the face of a strong increase of China's presence in both SITC-7 and 8 (see figure 2), the performance of Italy has been particularly affected in the consumer group: its market shares have almost halved, suggesting that the similarity with China specialization had a depressive impact on Italy's export performance. Conversely, for Germany's export structure, and in view of the overall shares of the country's manufacturing exports to other OECD markets reported in figure 1, "consumer goods" are relatively less relevant, while the machinery group keeps a strong performance.

**Figure 2.**  
**Market shares in OECD countries, Machinery (SITC-7) and Consumer goods (SITC-8)**



Source: Authors' elaboration on UN Comtrade data accessed via WITS

#### 4.2.1 Results by sector and by exporter

Table 2 summarizes the results of our estimates, reporting only the sign and the level of significance of the coefficients of Chinese market shares in third countries and the unit values of export. The complete set of results, including tests' statistics, are reported in tables A1-A4 in the appendix. Results show that, in general, market shares are strongly path dependent, i.e. increasing if they have increased also in previous periods and that they tend to be negatively affected by the distance with the host country. The remaining explanatory variables have a more heterogeneous pattern depending on both the exporter and the sectors taken into account.

**Table 2. Summary of main results, period 1995-2009**

SITC	Italy			Germany		
	SHARE_CH		Unit Value	SHARE_CH		Unit Value
	1995-2000	2001-2009		1995-2000	2001-2009	
71	-1.312**	-0.290**	0.0196**	-0.681	0.14	0.0268*
72	-2.379	0.665**	-0.0317*	-1.394	-0.773**	-0.00448
73	-0.562	-0.134	-0.0123	0.635	-0.228	0.0334
74	-0.72	-0.400**	0.0412**	5.041**	-0.224	-0.029
75	0.549*	0.156***	-0.00509	-0.0702	-0.143	0.0144
76	-0.486***	-0.106***	0.0181***	0.221	0.103	0.0449***
77	-1.452	-0.246**	0.00928	0.621	-0.389**	0.0527***
78	-0.572	0.0838	0.0327***	3.820***	0.36	0.00392
79	-1.855	0.0891	0.00685	-0.63	-0.304	-0.0429**
81	-0.234	-0.176***	0.011**	-0.7517**	-0.5341***	-0.0233**
82	0.0782	0.0289	-0.00415	-0.447	-0.379***	0.00154
83	-0.130*	-0.250***	0.00738	-0.262***	-0.0880***	-0.0532***
84	-0.169	-0.279***	0.0415***	-0.568**	-0.154**	-0.00818
85	0.0511	-0.349***	0.00272	-0.827***	0.0975***	0.000919
87	0.725*	-0.348***	0.011	-0.609	-0.299	0.038***
88	0.265	-0.491***	0.0106***	-0.045	-0.406	-0.0310**
89	-0.0246	0.117	0.0116	0.384	-0.0395	0.0232

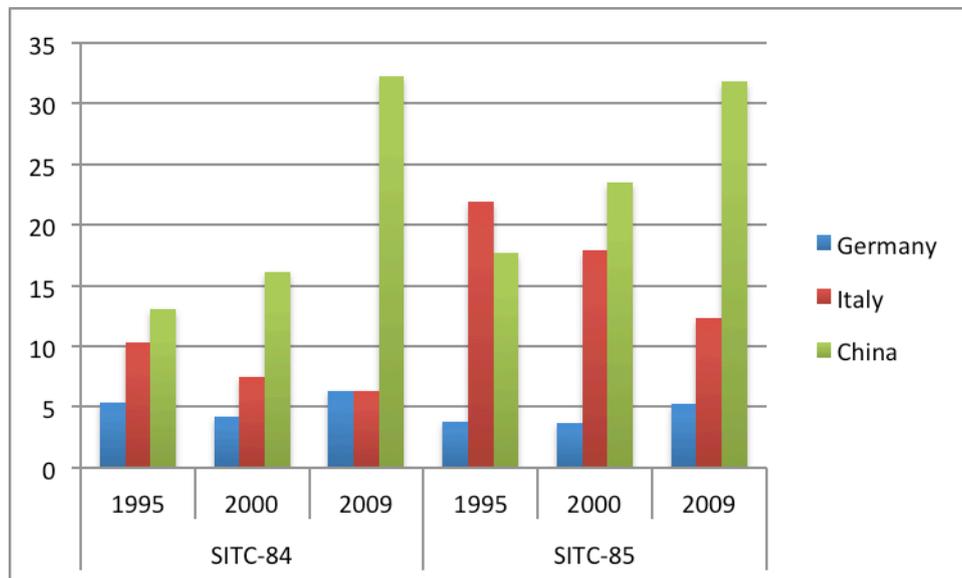
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Considering our main variables of interest, table 1 shows that, overall, China has had an impact on Italy's and Germany's shares in OECD markets for the main divisions of the manufacturing sector. This is especially true for the group including consumer goods (SITC -8) and for the period following China's accession to WTO.

Within consumer goods, the competitive impact from China is found on a similar number of divisions for the two countries, despite their different specializations. In the case of Italy this is on average larger for apparel and footwear products and smaller for the group including photographic apparatus and optical goods. A likely explanation is that China's rise in the group of consumer goods has been so large and so fast that market shares of practically each other relevant competitor have shrunk. As a matter of fact, in both countries only few divisions have apparently not been affected by the competition of China over the last fifteen years.

Specifically on the case of Italy, it is interesting to discuss more in depth the case of the so-called "fashion cluster", which includes apparel and footwear (SITC-84 and 85) and that accounted in 1995 for about 13% of Italy's manufacturing exports to OECD countries. Such divisions are those where China's market shares in the OECD has dramatically increased over time, reaching more than 30% of the world's total over the period considered (Figure 3).

**Figure 3.**  
**Market shares (% of total) in OECD countries, Apparel (SITC-84) and Footwear (SITC-85)**

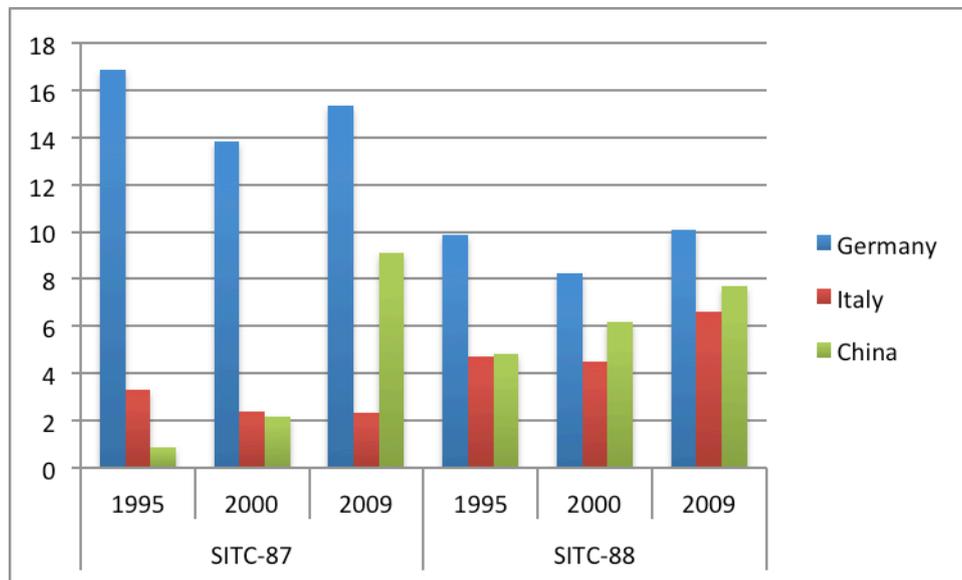


Source: Authors' elaboration on UN Comtrade data accessed via WITS

On the other hand, Italy's corresponding market shares have decreased. The negative sign of the China's coefficients can be therefore interpreted as a feature of such low technology sectors where competition is largely based on the costs of production factors. In the case of the apparel, this is more evident in view of the negative sign recorded also in the pre-WTO period, showing a long lasting effect of China in this division. Within-sector dynamics become then an important instrument to buffer competition from emerging economies. As a matter of fact, Chinese products are likely to have occupied the lower end of the markets with a possible segmentation of demand in destination markets. Recently, part of the literature suggested that in Italy a number of products in traditional sectors have undergone a quality upgrading as a strategy to keep market shares in high-end products (Marvasi, 2010; Armenise et al, 2008). Indeed, the coefficient of the unit value of exports for the division including apparel products reports a positive and significant sign, this being an indicator of gaining market shares in higher quality products, a strategy that could partially reduce the low value added competition coming from China.

On the other hand, it is worth highlighting how in sectors embodying higher technology content such as SITC-87 and 88, Germany has been able to keep its market power almost intact (figure 4), probably as a consequence of its capacity to keep quality standard higher. The positive sign on the coefficient of the unit value of German export in SITC-87 is a confirmation of this trend. Similarly, we notice that, despite a competitive pressure, Italy has been able to keep its market power within the group SITC-88 (figure 4) thanks also to a strategy of quality upgrading, showing that it has been able to keep a niche in more sophisticated goods leaving China to dominate the lower end products.

**Figure 4. Market shares (% of total) in OECD countries, Professional goods (SITC-87) and Photographic apparatus (SITC-88)**

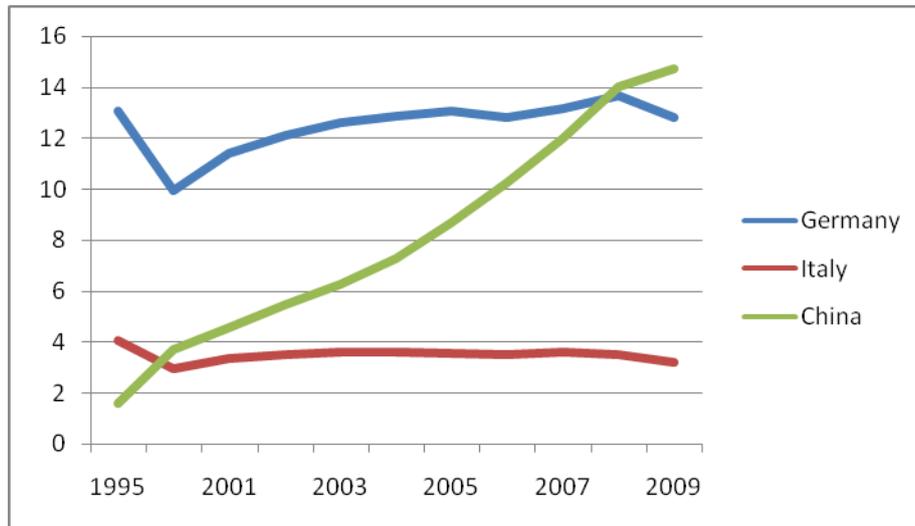


Source: Authors' elaboration on UN Comtrade data accessed via WITS

Conversely, results for the machinery and equipment group show a greater diversification between countries and an overall tendency of European exports to be resilient to China. As a matter of fact, over the course of the last fifteen years, the increase of Chinese market shares from 1% to 13% of the OECD market does not seem to have strongly affected Germany and Italy, whose shares have respectively slightly improved (Germany) or remained stable (Italy) since 2000 (figure 2). This is likely to depend on the characteristics of this group, where trade in parts and components is dominant and the Chinese specialization in final goods is recent.

Goods belonging to the electrical machineries division (SITC-77) however have seen both Italy's and Germany's market shares being displaced by China. The trend in market share for this specific division, depicted in figure 5, is indeed representative of an impressive rise of China, which has outplaced first Italy and then Germany becoming the most relevant exporter in this group in OECD markets. It is worth noting that this is a division where China is improving its comparative advantage while Italy and (to a lesser extent) Germany are relatively underspecialized, but where they keep niche productions, characterized by highest quality of their exports, as suggested in a recent paper by Ricotta et al. (2008) and, for the case of Germany, also from the positive sign of the price coefficient reported in table 1.

**Figure 5. Market shares (% of total) in OECD countries, Electrical Machinery (SITC-77)**



Source: Authors' elaboration on UN Comtrade data accessed via WITS

Considering that many of the divisions included in this group are characterized by high fragmentation of production and low shares of domestic content (Cappariello, 2012; Koopman et al., 2008), we refine our analysis by running model (2) separately for goods at different stages of production, classified according to the Broad Economic Categories (BEC). Table 3 below reports the result of (2) for final (including capital and consumer goods) and intermediate (including processing goods and parts and components) goods. There is a stronger impact of China's market shares on Italy's and Germany's shares in intermediate goods. As expected, final goods, being more specialized, are relatively less hit by China's competition and are most likely to see their market shares going up with an increase in products' prices, a sign of moving specialization to more value added productions.

**Table 3.**  
**Summary of main results for goods classified according to their end use, period 1995-2009**

Final goods	Italy			Germany		
	SITC	SHARE_CH		SHARE_CH		Unit Value
	1995-2000	2001-2009	Unit Value	1995-2000	2001-2009	Unit Value
71	-2.423*	-0.197	0.0150**	-0.669	-0.151	0.0430**
72	-3	0.479	-0.0278	-9.109**	-0.932**	0.0009
73	-0.491	-0.203	-0.00899	2.252	-0.0838	0.0345*
74	-1.545	-0.237	0.0435**	3.432	-0.375**	-0.0193
75	1.038***	0.163***	0.0122***	-0.0458	-0.237	0.0424***
76	-0.0455	0.0630**	0.0166***	0.126	-0.0118	0.0363***
77	-0.472	-0.168**	0.00135	0.54	-0.335***	0.0066
78	-0.864**	0.113***	0.0244***	0.399	0.0323	0.0323*
79	-0.342	0.0962	0.00645*	1.524	0.0583	-0.0358**

Intermediate goods	Italy			Germany		
	SITC	Share_ch		Share_ch		Unit Value
	1995-2000	2001-2009	Unit Value	1995-2000	2001-2009	Unit Value
71	-0.651***	-0.526***	0.0022	-2.606***	-0.0944	-0.00353
72	0.136	-0.182	-0.00858	-1.045	-0.367*	-0.00685
73	-0.783***	-0.223***	-0.0633***	0.104	-0.449***	-0.00867*
74	0.770*	-0.513***	0.0287***	1.344**	0.174	0.00739
75	-2.225***	0.0792***	0.00864***	-0.640***	-0.362***	0.0293***
76	-0.0318	-0.0482***	0.00830***	-0.438***	0.017	-0.00888***
77	-0.0275	-0.194*	-0.00933	-0.233	-0.361*	0.0562***
78	0.142	0.0607	-0.00641*	0.502	-0.301	0.004
79	-2.315**	0.0753***	0.0198***	-0.746	-0.360***	0.00564

## 5. Conclusions

Over the last decades, the success of Chinese exports has come at the expense of a large number of countries. Recent research has emphasized, on the one hand, the changes in Chinese specialization and, on the other hand, the competitive impact of Chinese manufacturing exports on many developing and emerging countries; European countries were at first considered sheltered, because of their possibly different specialization.

This paper contributes to the literature on the effect of China on exports of competitors, showing that Italy and Germany, two major manufacturing exporters, have been suffering for the increase in Chinese penetration in different sectors, especially after the country's entry in the WTO.

We estimate an augmented gravity model controlling for the direct effect of the increase in Chinese market shares on market shares of Italy and Germany. We find that both Italy and Germany suffer from competition, especially in consumer goods (SITC 8). However, in some division, such as apparel, some interesting dynamic prevails, with China specializing in low quality products and Italy, for instance, upgrading the quality of its products, as suggested by the positive and significant coefficient of the unit value of exports.

As for machinery (SITC 7), we proceed to a disaggregation by end use, i.e. we split final and capital goods from intermediate, and we find that competition is substantially stronger for the latter. In the final and capital goods sub division, the positive coefficient of the unit value suggests a specialization in different varieties of the same goods.

In summary, the results of the paper show a vulnerability of Italy and Germany to competition from China, different in different sectors but systematically higher after China's entry into the WTO; given that patterns of national export specialization tend to change slowly over time, it is unlikely that this vulnerability will diminish in the near future. This is particularly true for Italy, which is characterized by a very stable structure of competitive advantages in a very dynamic world.

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Appendix

Table A1. Results for the group of Consumer goods, Italian Export Shares 1995-2009

	SITC-8	SITC-81	SITC-82	SITC-83	SITC-84	SITC-85	SITC-87	SITC-88	SITC-89
L.share_it	0.400*** (0.0221)	0.436*** (0.0189)	0.662*** (0.0274)	0.405*** (0.0203)	0.359*** (0.0254)	0.317*** (0.0237)	0.380*** (0.0204)	0.426*** (0.0164)	0.291*** (0.0231)
L2.share_it	0.0793*** (0.0106)	0.0371*** (0.0101)	0.143*** (0.0125)		0.0545*** (0.0125)				
L3.share_it	0.0311*** (0.00886)				0.0166 (0.0110)				
lgdp	-0.0588** (0.0288)	-0.0274 (0.0196)	-0.0128* (0.00710)	0.0333* (0.0185)	0.00811 (0.0323)	-0.0292 (0.0246)	-0.0387 (0.0322)	-0.00294 (0.0174)	-0.146** (0.0731)
lgdp_pc	0.0185 (0.0766)	0.117*** (0.0423)	-0.0273 (0.0209)	0.0313 (0.0273)	-0.00354 (0.0524)	-0.160*** (0.0549)	-0.0259 (0.0649)	0.0381 (0.0464)	-0.134 (0.100)
ldist	0.0795 (0.0566)	0.0228 (0.0257)	-0.0293* (0.0161)	-0.0329 (0.0206)	0.0711 (0.0541)	-0.0664* (0.0360)	-0.0606** (0.0303)	0.140*** (0.0492)	0.179** (0.0789)
landlocked	-0.647*** (0.232)	-0.233** (0.101)	-0.0681 (0.0910)	0.308 (0.203)	-0.332 (0.225)	0.0629 (0.188)	0.167 (0.228)	0.442*** (0.162)	-0.564 (0.415)
comlang_off	-0.217 (0.263)	-0.0174 (0.157)	-0.00828 (0.182)	-0.0251 (0.126)	-0.122 (0.197)	-0.108 (0.251)	-0.0153 (0.142)	-0.405*** (0.155)	0.805 (0.570)
contig	0.569*** (0.218)	0.319** (0.126)	-0.0809 (0.0941)	-0.261** (0.101)	0.473** (0.223)	0.0713 (0.197)	-0.186 (0.199)	-0.0111 (0.131)	0.412 (0.487)
share_ch_pre	-0.00958 (0.140)	-0.234 (0.159)	0.0782 (0.142)	-0.130* (0.0731)	-0.169 (0.130)	0.0511 (0.153)	0.725* (0.400)	0.265 (1.464)	-0.0246 (0.166)
share_ch_post	-0.162 (0.114)	-0.177*** (0.0583)	0.0289 (0.0289)	-0.250*** (0.0251)	-0.279*** (0.0992)	-0.349*** (0.0843)	-0.348*** (0.0950)	-0.491*** (0.117)	0.117 (0.136)
luv	0.0460*** (0.0161)	0.0112** (0.00443)	-0.00415 (0.00382)	0.00738 (0.00454)	0.0415*** (0.0145)	0.00272 (0.0104)	0.0110 (0.00678)	0.0106*** (0.00285)	0.0116 (0.0141)
Constant	0.658 (1.023)	-0.671 (0.539)	0.898*** (0.281)	-0.866** (0.425)	-0.830 (0.836)	3.160*** (0.869)	1.807* (0.987)	-1.430** (0.610)	3.942** (1.862)
Observations	161,649	6,614	6,698	3,780	60,134	8,119	22,650	4,958	54,702
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
hansenp	0.536	0.674	0.418	0.406	0.406	0.304	0.420	0.468	0.263
ar2p	0.822	0.575	0.706	0.168	0.239	0.425	0.424	0.432	0.334

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A2. Results for the group of Consumer goods, German Export Shares 1995-2009

	SITC-8	SITC-81	SITC-82	SITC-83	SITC-84	SITC-85	SITC-87	SITC-88	SITC-89
L.share_de	0.445*** (0.0131)	0.348*** (0.0307)	0.478*** (0.0202)	0.337*** (0.0119)	0.449*** (0.0231)	0.316*** (0.0133)	0.499*** (0.0231)	0.535*** (0.0298)	0.422*** (0.0233)
L2.share_de	0.101*** (0.00888)				0.0849*** (0.0131)		0.117*** (0.0145)		0.0791*** (0.0152)
L3.share_de					0.0339*** (0.0111)		0.0712*** (0.0126)		
lgdp	-0.0634* (0.0380)	-0.00474 (0.0375)	0.0618** (0.0247)	0.00175 (0.00494)	-0.0280 (0.0191)	- (0.0108)	0.0153 (0.0256)	-0.0140 (0.0511)	0.00144 (0.0392)
lgdp_pc	0.134 (0.0959)	0.0772 (0.122)	0.0976** (0.0388)	-0.0187 (0.0130)	0.0900** (0.0447)	0.158*** (0.0248)	-0.187* (0.105)	0.347* (0.186)	-0.208** (0.0935)
ldist	-0.0266 (0.0551)	0.139*** (0.0518)	0.00817 (0.0432)	-0.00564 (0.00704)	0.0483 (0.0329)	-0.0110 (0.0291)	-0.0249 (0.0502)	-0.129 (0.0903)	-0.134** (0.0597)
landlocked	0.321*** (0.110)	0.361* (0.217)	0.0397 (0.130)	0.0634*** (0.0103)	0.0534 (0.100)	0.242*** (0.0477)	-0.0271 (0.136)	-0.126 (0.106)	0.402*** (0.130)
contig	-0.0839 (0.120)	-0.0655 (0.160)	0.00133 (0.0967)	0.0176 (0.0186)	0.102 (0.119)	-0.151** (0.0667)	0.127 (0.143)	-0.223 (0.154)	-0.235* (0.122)
share_ch_pre	-0.349 (0.267)	-0.752** (0.310)	-0.447 (0.282)	-0.262*** (0.0438)	-0.568** (0.222)	-0.827*** (0.165)	-0.609 (0.861)	-0.0450 (1.022)	0.384 (0.241)
share_ch_post	-0.150 (0.138)	-0.534*** (0.123)	-0.379*** (0.0634)	- (0.0142)	-0.154** (0.0711)	0.0975*** (0.0322)	-0.299 (0.188)	-0.406 (0.311)	-0.0395 (0.139)
luv	0.0187 (0.0152)	-0.0234** (0.0110)	0.00154 (0.00448)	- (0.00295)	-0.00818 (0.01000)	0.000919 (0.00406)	0.0384** (0.0163)	- (0.0137)	0.0232 (0.0186)
Constant	0.512 (1.050)	-1.520 (1.536)	-2.637*** (1.013)	0.449** (0.193)	-0.458 (0.739)	-0.565* (0.317)	1.620 (1.693)	-2.096 (2.118)	3.178** (1.286)
Observations	184,610	8,852	7,194	3,806	56,459	7,541	21,347	7,790	54,970
Time effects	Yes	Yes	Yes						
hansenp	0.0463	0.902	0.808	0.0876	0.00752	0.452	0.449	0.494	0.423
ar2p	0.00181	0.690	0.264	0.512	0.00721	0.704	0.201	0.731	0.570

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A3. Results for the group of Machinery & Equipment, Italian Export Shares 1995-2009**

	SITC-7	SITC-71	SITC-72	SITC-73	SITC-74	SITC-75	SITC-76	SITC-77	SITC-78	SITC-79
L.share_it	0.210*** (0.0142)	0.225*** (0.0254)	0.107*** (0.0157)	0.0792*** (0.0188)	0.213*** (0.0169)	0.274*** (0.0161)	0.403*** (0.0237)	0.259*** (0.0258)	0.470*** (0.0301)	0.224*** (0.0314)
L2.share_it		0.0523*** (0.00967)							0.0978*** (0.0168)	
L3.share_it									-0.0190* (0.0114)	
lgdp	-0.0270 (0.0576)	0.0382 (0.0477)	-0.0911 (0.0745)	0.0497 (0.0646)	0.0144 (0.0370)	-0.0294 (0.0437)	-0.0174 (0.0260)	-0.0893*** (0.0269)	-0.0425* (0.0244)	0.0190 (0.0831)
lgdp_pc	0.291** (0.120)	0.226* (0.126)	0.550*** (0.136)	-0.201 (0.223)	-0.00761 (0.0655)	0.107 (0.0901)	-0.238*** (0.0553)	0.248*** (0.0953)	0.0620 (0.0509)	-0.165 (0.178)
ldist	0.0199 (0.101)	0.0233 (0.0735)	-0.118 (0.0981)	-0.157 (0.130)	-0.00573 (0.0438)	-0.0688* (0.0399)	0.100** (0.0505)	-0.0691 (0.0586)	-0.0744* (0.0389)	0.497*** (0.175)
landlocked	-1.245* (0.681)	-0.271 (0.279)	-0.0672 (0.417)	-0.666 (0.799)	-0.905** (0.382)	-0.610** (0.255)	0.121 (0.286)	0.583** (0.289)	-0.194 (0.195)	0.915 (0.652)
comlang_off	0.400 (0.709)	1.123*** (0.358)	-0.142 (0.477)	-0.502 (0.747)	0.432 (0.303)	0.112 (0.266)	-0.0464 (0.202)	-0.905* (0.485)	0.0671 (0.186)	-0.308 (0.578)
contig	1.045 (0.789)	-0.130 (0.196)	-0.0430 (0.337)	0.576 (0.614)	0.380 (0.334)	0.0533 (0.137)	0.172 (0.255)	0.200 (0.243)	0.210** (0.106)	-0.0933 (0.340)
share_ch_pre	0.571 (0.683)	-1.312** (0.654)	-2.379 (2.621)	-0.562 (1.916)	-0.720 (0.740)	0.549* (0.293)	-0.486*** (0.142)	-1.452 (0.927)	-0.572 (0.407)	-1.855 (1.508)
share_ch_post	-0.256 (0.190)	-0.290** (0.138)	0.665** (0.305)	-0.134 (0.218)	-0.400** (0.176)	0.156*** (0.0485)	-0.106*** (0.0404)	-0.246** (0.0989)	0.0838 (0.0625)	0.0891 (0.0990)
luv	-0.0270 (0.0209)	0.0196** (0.00964)	-0.0317* (0.0186)	-0.0123 (0.0143)	0.0412** (0.0186)	-0.00509 (0.00402)	0.0181*** (0.00299)	0.00928 (0.00910)	0.0327*** (0.00574)	0.00685 (0.00495)
Constant	-2.419 (1.893)	-3.671** (1.714)	-2.244 (2.729)	2.159 (2.411)	-0.287 (1.331)	0.254 (1.014)	2.141*** (0.637)	0.309 (0.864)	0.982 (0.730)	-2.684 (2.267)
Observations	197,142	15,981	43,520	17,992	48,235	9,042	10,680	48,231	14,030	5,870
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
hansenp	0.270	0.710	0.117	0.275	0.341	0.578	0.565	0.330	0.0997	0.415
ar2p	0.00391	0.0778	0.757	0.913	0.151	0.693	0.761	0.443	0.908	0.876

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table A4. Results for the group of Machinery & Equipment, German Export Shares 1995-2009**

	SITC-7	SITC-71	SITC-72	SITC-73	SITC-74	SITC-75	SITC-76	SITC-77	SITC-78	SITC-79
L.share_de	0.232*** (0.0105)	0.287*** (0.0229)	0.124*** (0.0135)	0.167*** (0.0187)	0.274*** (0.0182)	0.416*** (0.0236)	0.446*** (0.0275)	0.351*** (0.0207)	0.430*** (0.0310)	0.250*** (0.0252)
L2.share_de		0.0475*** (0.00669)		0.0356** (0.0148)	0.0621*** (0.0129)					
lgdp	-0.0906** (0.0440)	-0.0328 (0.0428)	0.0402 (0.0670)	0.0640 (0.0401)	-0.0376 (0.0340)	-0.0245 (0.0378)	-0.0641* (0.0341)	-0.0123 (0.0236)	0.00196 (0.0601)	0.0186 (0.0534)
lgdp_pc	-0.00484 (0.123)	0.201 (0.179)	-0.163 (0.209)	-0.192 (0.146)	0.232* (0.130)	-0.205** (0.0959)	-0.235** (0.113)	-0.169 (0.124)	-0.637*** (0.162)	0.149 (0.223)
ldist	-0.0565 (0.0728)	-0.0297 (0.0637)	0.103 (0.0879)	-0.100 (0.0732)	0.108* (0.0557)	-0.0473 (0.0393)	0.0154 (0.0778)	-0.0961 (0.0657)	-0.162* (0.0949)	0.153 (0.0932)
landlocked	1.203*** (0.285)	0.565** (0.222)	-0.957 (0.614)	0.118 (0.159)	0.439** (0.203)	0.150 (0.124)	0.347** (0.148)	0.749*** (0.233)	0.0493 (0.261)	-0.127 (0.205)
contig	-0.443* (0.249)	-0.0637 (0.163)	0.119 (0.299)	-0.0574 (0.177)	0.182 (0.159)	0.00417 (0.150)	0.0124 (0.126)	-0.489 (0.302)	-0.0998 (0.259)	0.389 (0.301)
share_ch_pre	0.214 (1.119)	-0.681 (1.824)	-1.394 (2.318)	0.635 (3.028)	5.041** (2.469)	-0.0702 (0.497)	0.221 (0.254)	0.621 (0.896)	3.820*** (1.302)	-0.630 (1.515)
share_ch_post	-0.426* (0.249)	0.140 (0.561)	-0.773** (0.347)	-0.228 (0.261)	-0.224 (0.176)	-0.143 (0.179)	0.103 (0.0870)	-0.389** (0.188)	0.360 (0.428)	-0.304 (0.423)
luv	0.0178 (0.0207)	0.0268* (0.0155)	-0.00448 (0.0282)	0.0334 (0.0205)	-0.0290 (0.0218)	0.0144 (0.0132)	0.0449*** (0.0133)	0.0527*** (0.0160)	0.00392 (0.0249)	- (0.0173)
Constant	3.044* (1.773)	-1.025 (2.457)	0.180 (2.658)	1.133 (2.072)	-2.095 (2.057)	3.192** (1.404)	3.910*** (1.282)	2.842* (1.471)	7.977*** (2.041)	-3.002* (1.719)
Observations	216,587	15,598	47,153	17,423	46,197	12,399	12,653	51,625	18,436	7,895
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
hansenp	1.67e-05	0.0465	0.582	0.0871	0.0440	0.470	0.463	0.466	0.175	0.606
ar2p	0.000184	0.0496	0.833	0.115	0.0774	0.200	0.0906	0.887	0.182	0.843

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0

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