

# The “China effect” on Italian Exports

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## 1. Introduction

The rapid growth of China in the last thirty years has had a very strong impact on the world economy. Having gone through a rapid process of structural transformation as well as international integration, China has recently improved quantity and quality of its exports. Its market share has increased dramatically, so that in 2009 China overtook Germany to become the first world exporters of goods. There is an ample literature questioning whether this upgrade is likely to result in a change in Chinese comparative advantage towards more sophisticated productions and therefore whether there are countries/sectors more subject to the Chinese competition.

Against this background, this paper analyzes the indirect impact of China on Italian exports to its main trading partners. Among developed countries, Italy, given its specialization in low technology manufacturing products, is likely to be one of the most at risk from China’s competition. Using disaggregated data at 6-digit level of the harmonized system (HS) classification for the period 1995-2007, this paper aims at measuring the existence of a displacement effect at sector and market level. Preliminary results show that there is indeed a significant negative effect of Chinese exports particularly in high income countries and in traditional sectors (such as textile).

The paper proceeds as follows. Section 2 briefly reviews the literature on the upgrading of Chinese exports. Section 3 provides the analytical framework referring to the literature on the impact of China on developed countries through the trade channel. Section 4 specifies the econometric model, describing the data, methodology and the results. Section 5 concludes, summarizing the main findings.

## 2. The upgrading of Chinese exports: a sketch of the main issues

### 2.1 *The structural composition of Chinese exports*

Since its entry in international markets, China has been characterized for its capacity to supply low cost manufactures. Over time, China has widely increased the range of products that it exports. Analyses based on the most disaggregated statistics on trade (at the 6-digit of the Harmonized System), show that China now 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. If in the pre-reform era, characterized by a small share on world trade, capital intensive goods were the main Chinese exports, in 1985 the largest Chinese export (20% of total) was petroleum (Branstetter and Lardy, 2006). Following an

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intense liberalization process started in 1984<sup>2</sup>, exports have grown rapidly and their structure moved to labor intensive commodities, especially textiles, garments and miscellaneous manufactures (Naughton, 2007). Following a slowdown corresponding to the 1997/98 Asian financial crisis, a new wave of liberalizations occurred after the definitive admission of China to WTO of December 2001. The trade surge that followed WTO-accession has been characterized by a further change in the export structure across the manufacturing sector. As it had already happened to other developing countries, especially from East Asia, there is evidence of a reallocation of traditional Chinese exports (namely footwear, textiles, toys) in the manufacturing sector. Over the last decade, the composition of the manufacturing sector has moved towards more sophisticated categories of products, with a growing relevance of the SITC-7 classification (machinery and transport equipment) compared to the lower value added categories (namely SITC-8 miscellaneous manufactures and SITC 6 manufactured materials). Looking at 2-digit data from the SITC classification, it is possible to note a rapid decline in the contribution of the so-called “fashion cluster” (SITC 65, 84 and 85) and other low technology manufacturing (SITC 89) to total exports. This decline in traditional exports has corresponded to a sharp increase of higher technology sectors.<sup>3</sup>

This evidence triggered a debate, shortly referred to below, on how much of this structural change can be attributed to an effective upgrading of export capabilities of Chinese firms.

## ***2.2 The debate on China's exports sophistication***

The changes occurring in China's export structure have been the object of a recent research, undertaken with the aim of understanding whether this structural change can be considered exceptional for a country still at an early stage of economic development or not and which factors have mostly contributed to it. Many implications are likely to arise from this research question. A first issue, relevant for what follows in this paper, is whether the competitive threat from China is shifting from developing countries to more developed markets. At the theoretical level, the debate on the rise of export sophistication of developing countries may help to shed light on both the ‘old’ and the ‘new’ theories of trade. It focuses on the aspects related to narrow the concept of specialization in different stages of value-added within the product space and on the effects on international prices of the specialization/diversification of their export structures. Also, this stream of research points out the nexus between structural transformation of developing countries and their economic growth.

The pioneering study of Lall and Albaladejo (2004) has shown that, starting in the nineties, Chinese exports have been slowly moving from traditional low- technology specialization to medium and high-technology productions, drawing particularly on the technology transfer from foreign multinational enterprises (MNEs) and the high spending in research and development (R&D).

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<sup>2</sup> According to Naughton (2007), the main political measures to promote exports have consisted in a de-monopolization of foreign trade regime, with more trading companies allowed to trade; the establishment of the export-processing trade regime granting special status to foreign invested enterprises (FIEs); a real devaluation of renmibi of 60% to the dollar (that has been kept substantially up to 2005, with an exceptional overvaluation in correspondence of the Asian financial crisis of 1997).

<sup>3</sup> Advanced sectors we refer to belong to the SITC-7, and especially SITC- 75- office machines, 76- telecommunications equipment and 77- electronics

According to the authors, this could induce, over time, a shift in the competitive pressure from developing Asian countries to more developed ones.

It is, however, Rodrik (2006) that shows how, starting from 1992, Chinese exports have become relatively more sophisticated and that, in 2003, the export structure of the country could have been most likely that of a country with an income per capita three times higher than the Chinese one.<sup>4</sup>

The so-called “China is special” argument (Xu, 2007) proposed by Rodrik has been confirmed in two recent, and somehow more cautious, studies by Schott (2008) and Fontagné et al. (2008). Both studies measure export sophistication by means of unit values. Schott (2008), analyzing up to ten-digit disaggregated data on US 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 (group SITC-6). A similar conclusion is reached by Fontagné et al. (2008). Using data on the unit value of exports, Fontagné et al. (2008) 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 superior specialization of a cross varieties within the same products.

A different strand of literature, however, objected to the hypothesis of export sophistication. In summary, some studies emphasize external factors (processing trade, inward FDI and foreign invested enterprises), while others identify internal conditions (domestic policies and regional disparities) as contributing to the recent upgrade in Chinese exports.

Part of the literature emphasizes the importance of processing trade (Xu and Lu, 2008; Amiti and Freund, 2008). Analyses focusing on China's export upgrading (e.g. Schott, 2008) tend to neglect the role of imports. Data on aggregate trade flows might suffer some limitations, the major being what is called a “statistical illusion” (Lall, 2000); i.e. the specialization of a country in the lowest value-added activities into the more advanced sectors. This occurs in those sectors (like the SITC 7, and especially in machinery and transport equipment) largely characterized by trade in parts and components (Jongwanich, 2007). Processing trade has long represented a characteristic of Chinese exports, which have been historically linked to inward FDI (Liu et al., 2002), given that the greatest share of export from China still comes from foreign invested enterprises. The most recent data show the relevance of processing trade on total Chinese exports (ranging from 53% of China custom statistics data to 68% of international organization data). Nonetheless, some other works – observing the growing trade surpluses of China over the recent years – have shown that the structural change of Chinese export might have contributed to a progressive de-linkage between imports and exports. In these studies, it is claimed that China is starting moving up the value chain (Humprey and Schmitz, 2007), thanks to a more prominent role played by domestic production (spurred by growing investment) and a declining relevance of imports of processing goods (Cui and Syed, 2007; Yusuf, 2008; Winters and Yusuf, 2007).

Similarly, foreign invested enterprises (FIEs) affect significantly the structure of Chinese exports, accounting for about 30 to 50% of Chinese exports<sup>5</sup>, especially in technologically advanced sectors

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<sup>4</sup> The work of Rodrik is based on the export sophistication indicator EXPY that had been previously developed by the same author together with Hausman and Hwang (Hausman et al., 2007).

(Dean et al., 2007). Koopman et al. (2008), based on input/output tables, find that the domestic value added is lower than 50% in sophisticated sectors<sup>6</sup> 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). In addition, foreign firms in electronics and IT sectors in China are mainly wholly owned subsidiaries, and this limits the opportunities of learning by domestic firms through knowledge transfer compared to Joint Ventures (Branstetter and Lardy, 2006; Dean et al., 2007; Xu and Lu, 2008).

The second line of research highlights the role of internal factors such as domestic policies and the existing disparities in the distribution of wealth among the Chinese territories.

According to Rodrik (2006), Chinese policies to attract foreign investors, stimulating technology transfer and promoting the development of selected sector have been of paramount importance in enhancing the structural change. In line with this, Vaidya et al. (2007) illustrate how the emergence of some domestic firms in high tech sectors (such as the telecommunications) has been promoted by government policies both in terms of the provision of a favorable policy regime and through opportunity of leveraging capabilities from foreign firms<sup>7</sup>. In addition, Wang and Wei (2008) considered the government's efforts in promoting special economic zones (e.g. EPZs and high-tech zones) and investing in human capital as having a strong positive impact on the sophistication of export structure.

### ***2.3 The evolving nature of China comparative advantage***

The arguments presented above may cast some doubts on the fact that China's export structure has really upgraded; however, there is no negligible evidence of a structural transformation of Chinese exports. The rest of this paragraph investigates the main consequence of the structural transformation on the pattern of comparative advantage of China.

Vaidya et al. (2007), adopting the technological classification of OECD to classify Chinese exports by sectors on the base of their R&D spending, find evidence of rising comparative advantages (using the Balassa index) for high-tech products<sup>8</sup>. This rise in revealed comparative advantages is consistent with two additional measures: 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 somehow confirmed in a study on the electronics sector (Van Assche and Ganges, 2008). They look at detailed data on some product categories into the electronic sector and show that Chinese exports

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<sup>5</sup> More precisely, according to the official data from China Commerce Yearbook (2007), in 2006 FIEs accounted for the 58% of Chinese exports. In 1992, this figure was 20%.

<sup>6</sup> 13 over 61 sectors, including the most sophisticated: computers & accessories; telecommunication equipment; electronic devices

<sup>7</sup> As a matter of fact, the recent rise of Chinese FDI abroad is a consequence of this. Many Chinese MNEs are currently involved in international ventures abroad, often pushed by domestic policies, often with the aim of enhancing their competitive advantages in many advanced countries, including Italy (cf. Pietrobelli et al., 2010).

<sup>8</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

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 in the electronics.

Other analyses have found 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). 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).

One of the main findings of unit-value based analysis is that most of the high tech products (e.g. consumer electronics) exported by China have in general declining prices and are exported in large quantities. This is considered by some authors an indication of low quality of production (Van Assche and Ganges, 2008; Amiti and Freund, 2008).

Amiti and Freund (2008) adopt a Gini index to measure whether the Chinese export structure has shown a pattern of diversification or specialization during two distinct periods (1992 and 2005), finding strong evidence in favour of specialization. In addition, they show that – at least in the case of exports to US – the shift in the export structure has not been accompanied by an increase in the varieties exported (the *extensive margin*), but rather it has consisted of an increase in the quantity of existing varieties (the *intensive margin*). This has significant implications for the theoretical debate. On the one side, consistently with 'old' trade theories, in the case of China, economic growth has been accompanied by a specialization in exports. On the other, the increase in specialization and the corresponding rise in the *intensive margin* of trade have had a strong influence on international terms of trade, making prices of manufacturing goods more competitive worldwide. Indeed, Kaplinsky and Santos-Paulino (2005) use imports of EU (at the 8-digit HS from Eurostat) to test for recent trends in unit values in the manufacturing sector. They show that export prices are most likely to fall in low income exporters, especially in those sectors in which China is a relevant exporter (Kaplinsky and Santos-Paulino, 2005).

### **3. The impact of Chinese exports on Italian exports**

Following China's entry into the WTO, some papers have investigated the possible impact on trade performance of different groups of countries (Shafaeddin, 2002; Yang, 2006), mainly focusing on East Asia, since the role of China in its home region has been crucial in the re-organization of global production networks where China is now specializing on the assembling of intermediate products coming from the neighbor countries (Gaulier et al., 2006). As a consequence, 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., 2006; Yusuf, 2008).<sup>9</sup>

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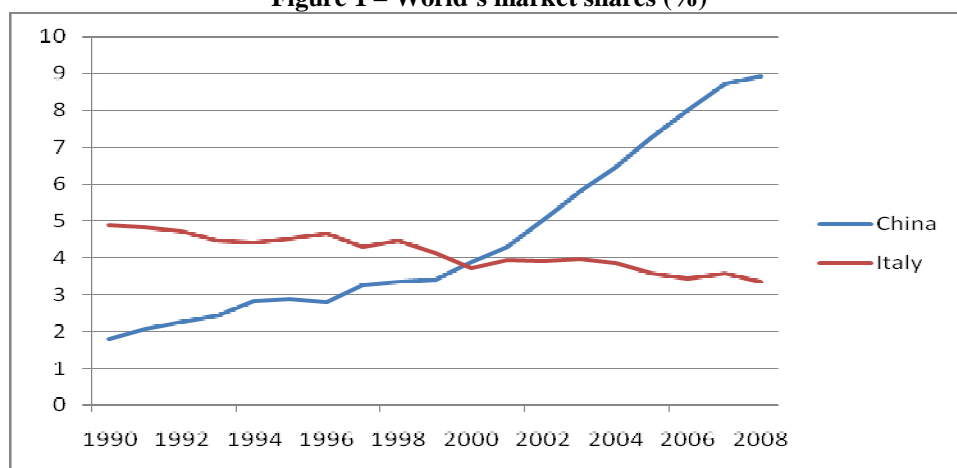
<sup>9</sup> Lall and Albaladejo's (2004) empirical analysis (based on a market share analysis) shows that, "mature tigers" were starting suffering most the Chinese competition in low-tech sectors, but they hold advantages in sectors with no particular threats from China. Conversely, the "new tigers" are most dynamic, although they have lost market shares in low quality products (Gaulier et al., 2006). More specifically, the 'China effect' has been felt mainly by less developed Asian countries exporting consumer goods via the competitive effect in third markets (Eichengreen et al., 2004; Eichengreen et al., 2006; Humprey and Schmitz, 2007), compared to the capital exporters and more advanced countries

More recently, some papers analyzed the impact of China on other developing countries in Latin America and Africa (Jenkins et al., 2008; Giovannetti and Sanfilippo, 2009).

Conversely, little attention has been given so far to the possible impact on developed countries, whose productive structures were considered to be less at risk due to the relatively less sophisticated exports from China. However, some developed countries might be equally considered “at risk” because they produce and export manufactures. Italy, for instance, represents an interesting case given that its productive structure is based on so-called “traditional” sectors, i.e. those less intensive in technology and skilled labor. Indeed, some recent analyses have shown that the overlap between Chinese and Italian trade specializations has been growing considerably over the period 1991-2001, especially in low skilled sectors (Amighini and Chiarlone, 2005). The same study points out that this overlap has risen in some skill intensive sectors in the manufacturing, although, in this case, the quality of Italian products still represents a safeguard from Chinese competitive pressure.

Italy’s specialization in low skilled production, whose world demand has been recently grown less than the world average, has been often used to explain Italy’s loss of world’s market shares over the last twenty years (Barba Navaretti et al, 2007; De Arcangelis et al, 2002, Lanza and Quintieri, 2008). Furthermore, several authors have shown that Italian comparative advantages have remained fairly stable over time (this being also true for EU27, cf. De Mauro et al, 2010)<sup>10</sup> and that the shift in Italian specialization has been more “within sectors” than “between sectors” (Giovannetti and Quintieri, 2008). At the same time, China has increased its shares on global markets, rapidly catching-up on developed countries and becoming in 2009 the first world exporter ahead of Germany (ICE, 2010).

**Figure 1 – World’s market shares (%)**



Source: Authors’ elaboration on UNCTAD Statistics (<http://unctadstat.unctad.org>)

China’s main source of competitive advantage has historically been related to low wages (Shafaeddin, 2002). Hence, Chinese competitive advantage has resulted in a strong pressure on export prices in the manufacturing sector. A recent work by Fu et al. (2010) has shown that, over

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in general, the effects being stronger when also exports from Hong Kong are added to Chinese ones (Greenaway et al., 2006).

<sup>10</sup> Note that measures of export specialization and export shares are affected by the International fragmentation of production . Note also that in the presence of an increase in market shares like the one of China, all the competitors have lost market shares. Amongst EU countries, Germany seems to have performed better than others.

the last twenty years, Chinese export competitiveness has influenced the export prices of almost all country groups, including high income countries in low technology product markets. Focusing on Italy, Bugamelli et al. (2010) show that the competitive pressure by Chinese exports has contributed to a decrease in output prices of domestic firms, especially the smaller and those specialized in traditional sectors.

Table 1 below compares the average unit values of Chinese and Italian exports, for each product at 6 digit of the harmonized system. Taken as a whole, the unit value of Chinese exports is on average one third of the Italian. At a more disaggregated level, larger gaps are detected in the manufacturing traditional groups, including the so-called “fashion” cluster (cf. SITC 65 and 85). This result is consistent with that of Fontagné et al. (2008), who adopted the unit value ratio of exports at 6-digit of the harmonized system for all the country pairs to show that the relative prices of Chinese exports in 2004 were substantially lower than those of developed countries (around 30% of EU25, US and Japan’s prices).

**Table 1 – Average Unit Values of Italian and Chinese exports in selected sectors**

	ALL	SITC-6	SITC-7	SITC-8	SITC-65	SITC-84	SITC-85
<b>Italy</b>	228.87	246.05	231.16	259.84	304.91	386.51	86.46
<b>China</b>	78.97	70.62	100.42	56.03	15.96	37.53	16.39

## 4. The Model

### 4.1 The empirical analysis

To explain the dynamics of competition between Italian and Chinese exports, we estimate a gravity model on bilateral exports. Gravity models have been firstly introduced in economics by Tinbergen (1962) to describe trade channels between two countries, as gravity models in physics do to explain how two forces are attracted to each other. These models perform particularly well in applied analyses, and they have been widely used in explaining international trade. For instance, they have been adopted to analyze the impact of trade-related policies such as the effects of participation to free trade agreements (Rose, 2003; Fontagné and Zignago, 2007) or to monetary unions (Serlenga and Shin, 2004). Recently, gravity models have been extended to measure the effect of Chinese export on other Asian countries’ exports (Eichengreen et al., 2004; Eichengreen et al., 2006; Greenaway et al., 2006) and on Sub Saharan African countries exports (Giovannetti and Sanfilippo, 2009). ISAE (2005) has adopted a similar model to assess the effect of competition of Chinese exports on three EU countries (Italy, France e Germany) for the period 1993-2003.

The fundamental innovation in these models<sup>11</sup> is to augment the traditional gravity equation, including Chinese exports to the same markets among the independent variables.

Despite the generally good fit which has triggered their wide use, from an empirical point of view, gravity models need to be taken with care in several dimensions. Firstly, they model a variable with

<sup>11</sup> First introduced in the work of Eichengreen et al. (2004).

strictly positive support and cannot be implemented if the dependent variable has missing or zero values. Thus, in principle, gravity models cannot be implemented if the dataset where the model's dependent variable is exports of country  $i$  to a set of countries, for instance, has missing values (or zeros). Secondly, the OLS estimates are biased and inconsistent due to possible endogeneity<sup>12</sup> in the model. The statistical literature suggests two possible solutions: exponential multiplicative model estimation (Poisson pseudo maximum likelihood) or two stage least squares method<sup>13</sup>.

Our model adapts a gravity approach to the Italian case, stressing the role of geographical areas and highly disaggregated data on sectors using the BACI database of CEPII:

In line with Eichengreen et al. (2004) we estimate:

$$X^{IT}_{j,hs6,t} = C + \beta_1 CH\_EXP_{j,hs6,t} + \beta_2 GDP^{IT}_t + \beta_3 GDP_{j,t} + \beta_4 UVRATIO_{j,hs6,t} + \beta_5 T^IT_j + e_{j,hs6,t} \quad (1)$$

Where  $X$  represents the Italian export towards country  $j$  in sector  $hs6$  in year  $t$ . GDPs represent the GDP levels of the importer  $j$  and of Italy, while  $T$  is a country and time invariant set of variables including factors that may favour or limit trade flows: bilateral distance between Italy and the importers, lack of an access to the sea of importers, common boundaries between Italy and the importers.  $UV\_RATIO$  is the ratio between Chinese and Italian export unit values: it represents the average value weight of Chinese export compared to Italian export (as in Table 1).  $CH\_EXP$  Chinese exports towards country  $j$  in sector  $hs6$  in year  $t$ . A negative sign of this variable (and its statistical significance) indicates an inverse relationship between Chinese and Italian exports, suggesting a substitution effect (everything else being equal).

In this paper, we use a two stage least square method with instrumental variables to avoid endogeneity. Since the model includes bilateral variables like distance (between Italy and the importer) and contiguity - country and time invariant variables- we do not include country fixed effects. . In line with existing literature, we find that Chinese exports are endogenous and that distance from China of importing country  $j$  and Chinese GDP are good instruments to eliminate the endogeneity introduced by the Chinese exports regressor. We cluster errors with respect to products at 6 digits level ( $hs6$ ) due to the presence of heteroschedasticity in the dataset.

#### **4.2 Results – full sample and by levels of income.**

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<sup>12</sup> The basic idea behind the concept of “endogeneity” is that one or more variables in the model do not vary autonomously from each other, independently of the other variables in the model (Engle, et. al.,1983). A variable is said to be endogenous when there is a correlation between the variable and the model error term. It can arise as a result of measurement error, autoregression with autocorrelated errors, simultaneity, omitted variables and sample selection errors

<sup>13</sup> Previous works on the displacement effect caused by China have adopted a 2SLS based on the instrumental variables (IV) method. This because the study of Eichengreen et al. (2004), measuring the displacement effects of China on other Asian countries exports, has recognized the potential endogeneity of China's exports. According to the authors, this is due to the fact that any unobservable factor that affects a country imports from the exporter (Italy) may also have an impact on the imports from China. In the econometric literature this means that the variable of interest of the model, i.e. China exports, might be correlated to the error term and that one or more instrumental variables should be adopted to avoid biased estimations. Other studies measuring the crowding-out effects among developing countries have adopted instrumental variables methods based on two stages regressions (Eichengreen et al., 2006; Greenaway et al., 2006; Giovannetti and Sanfilippo, 2009).



The dataset covers the period 1995-2007 and includes 177 countries. Data on bilateral trade flows, classified according to the harmonized system (1992) at 6-digit level, come from the BACI dataset published by CEPII (cf. Gaulier and Zignano, 2008). The BACI dataset includes about 5,000 products, however the ones in which China and Italy effectively compete are less. More specifically, we included in our dataset only those products that were exported at the same time by Italy and China to the same market.

Bilateral distances, measured as a simple distance (in Km) between the two most populated cities, comes from the CEPII, as well as the dummies indicating the lack of an access to the sea and the territorial contiguity between Italy and the importer country. Data on GDPs of the exporter and the importers come from the World Bank World Development Indicators.

Except for the two dummies, all variables have been transformed in natural logarithms. Descriptive statistics of the (time variant) variables are reported in Table 2.

**Table 2. Descriptive Statistics**

<b>Variable</b>	<b>Description</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
lv_export	Log of Italy's export values	2105564	4.077	2.618	-7.050	15.069
lit_gdp	Log of Italy's GDP	2105564	28.074	0.158	27.840	28.313
lgdp	Log of importers' GDP	2070807	25.328	1.825	18.461	29.493
lch_v_export	Log of China's export values	2105564	4.128	2.691	-7.133	16.155
luvratio	Log of unit values ratio	1561555	-0.839	1.495	-16.120	14.192

Table 3 reports the results for model (1) for different specifications. The first column of Table 3 reports the estimation results of the general model, i.e. taking into account all the countries and sectors at the same time. The last row of Table 3 reports the results of GMM distance test on endogeneity showing that for all specifications considered the instruments are valid.

**Table 3. Estimation results of the general model and by income groups**  
*dependent variable log of Italian Exports.*

	(I) General	(II) OECD	(III) High (other)	(IV) Middle up	(V) Middle low	(VI) Low
lch_v_export	-0.00745 (0.0145)	-0.741*** (0.0518)	0.305*** (0.0129)	-0.0861*** (0.0212)	-0.0153 (0.0224)	0.192*** (0.0266)
lit_gdp	-0.909*** (0.0305)	-0.155*** (0.0561)	-1.015*** (0.0399)	-0.810*** (0.0395)	-0.940*** (0.0383)	-1.334*** (0.0598)
Lgdp	0.576*** (0.0101)	1.111*** (0.0366)	0.361*** (0.0117)	0.627*** (0.0143)	0.559*** (0.0142)	0.366*** (0.0151)
luvratio	0.0824*** (0.00622)	-0.115*** (0.0216)	0.133*** (0.00770)	0.0994*** (0.00810)	0.111*** (0.00651)	-0.00142 (0.00631)
landlocked	-0.312*** (0.00960)	-0.562*** (0.0345)		-0.338*** (0.0186)	-0.333*** (0.0213)	-0.0885*** (0.0233)
Contig	0.380*** (0.0161)	0.396*** (0.0251)	0.185*** (0.0334)			
Ldist	-0.667*** (0.00874)	-0.557*** (0.0163)	-0.673*** (0.0153)	-0.656*** (0.0107)	-0.665*** (0.0103)	-1.110*** (0.0366)
Constant	20.59*** (0.956)	-12.29*** (1.890)	27.88*** (1.173)	16.81*** (1.264)	21.80*** (1.235)	40.27*** (1.866)
Observations	1,534,825	473,654	159,989	390,879	358,749	151,554
F-test	2686.61 (0.000)	1265.10 (0.000)	1497.92 (0.000)	1946.53 (0.000)	1727.41 (0.0000)	1238.23 (0.0000)
Hansen J statistics	979.576 (0.000)	9.633 (0.0019)	662.709 (0.0000)	672.593 (0.0000)	716.001 (0.0000)	560.150 (0.0000)

Robust standard errors in parentheses

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

Gravity type control variables have in general the expected sign and are highly significant. Italian exports grow with an increase in the demand (represented by a positive sign of the host country GDP) and are mainly directed towards those countries with whom Italy shares a border. On the other hand, exports decrease with the distance and tend to further decrease in countries that lack an access to the sea. Contrary to *a priori* expectations, the coefficient of the Italian GDP has a negative sign. This could be due to the fact that, in the presence of a rising domestic demand and imperfectly competitive markets, firms could switch from international to domestic markets.<sup>14</sup>

The Chinese exports' coefficient presents a non significant (negative) sign, suggesting the absence of a competitive effect on total Italian exports. However, the large interval of confidence suggests a high variability of the China effect.

Finally, it is worth noting that the estimated coefficient of the relative unit value of Chinese exports (a proxy for relative prices and, therefore, quality differences) is positive and significant, suggesting that more competitive prices of Chinese exports compared to Italian ones trigger a decrease in domestic exports.

<sup>14</sup> In future research, to further investigate this issue, we shall increase the number of exporters, introduce GDP lags and/or a proxy for market pressure.

In order to further investigate the characteristics of the possible Chinese competition on Italian exports and to take into account the possibility of different consumers' preferences in different groups of countries<sup>15</sup>, columns (II-V) of Table 3 report the results of model (1) for the importer countries grouped on the basis of their income according to the World Bank classification.<sup>16</sup> We find: (i) evidence of a different impact of Chinese exports on Italian exports for different income levels and that (ii) the China effect is present and significant in the main markets of Italian exports.<sup>17</sup>

In OECD countries, i.e. where Italy holds the largest market shares globally, we find evidence of the largest impact of Chinese exports. This result is consistent with the analysis by ISAE (2005), which shows that the competitive effect of China on Italy over the period 1993-2003 is statistically significant only for the sub-group including the OECD markets. Results reported in column IV show that the competitive pressure by Chinese exports is relatively strong also in middle up income countries (including, among others Russia, Turkey, South Africa, Poland, Romania and some Mediterranean countries, such as Libya and Lebanon)<sup>18</sup>. Finally, no competitive pressure is found on the group of low income countries, where Italy traditionally does not hold significant market shares.

Concerning other variables, we note that the numerical value of host country GDP (a proxy for international demand) is quite large in the case of OECD countries. This may suggest that Italian exports react fast to an increase in the demand of richest economies. The coefficient of the relative unit value of Chinese exports is positive for all income groups, but OECD. This suggests that in highly sophisticated markets, when Italian and Chinese firms compete on the same products, a decrease of unit value of Chinese exports may lead to a corresponding increase of Italian exports and that the larger the price differential, the larger the quality gap between the products exported by Chinese and Italian firms.

#### *4.2.1 OECD markets*

We further investigate the Chinese competitive pressure on Italian exports into OECD and middle income markets,<sup>19</sup> to check whether it is widespread across all sectors or if it is concentrated in specific ones. In order to do so, we adopt the SITC rev. 3 classification, focusing our attention to sectors where the potential competition between Italy and China is likely to be higher: intermediate products (SITC-6), machinery and equipment (7), and consumer goods (8).<sup>20</sup>

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<sup>15</sup> We also run model (1) for destination markets grouped according to their continent. Results point to a significant competitive effect from China in all the continent but Africa. The stronger effect is recorded on the European continent, which includes both the EU 27 and the eastern countries (including Russia).

<sup>16</sup> The classification refers to the year 2006 and comes from the CEPPII dataset. As in Fu et al. (2010), we assume that the membership of the income country groups were stable over the period under consideration. In other specifications not reported for reasons of space, countries have also been grouped by continent.

<sup>17</sup> Italy exports around 68% in EU countries, US are the third market of destination while Poland and Russia, both belonging to the "middle up" income group, are among the first ten (ICE, 2010).

<sup>18</sup> More specifically, the "middle up income" group includes the following countries: Argentina, Barbados, Belize, Chile, Costa Rica, Croatia, Czech Republic, Dominican Republic, Equatorial Guinea, Estonia, Gabon, Grenada, Hungary, Lebanon, Latvia, Libya, Lithuania, Malaysia, Mauritius, Mexico, Oman, Panama, Poland, Romania, Russia, Seychelles, Slovakia, South Africa, Trinidad and Tobago, Turkey, Uruguay and Venezuela.

<sup>19</sup> Together, these two groups of countries account for about 53% of total observations of the sample.

<sup>20</sup> During the period 1995-2007, the manufacturing sector (SITC - 5 to 8 less 667 and 68) has represented 87.4% of Italy's global exports, with these three sectors accounting for 78% of total. Similar shares (87.3% and 77.5%) have been recorded over the same period for the sub-sample of developed countries.

Table 4 below reports results from model (1) disaggregated by sector when the destination market is confined to OECD countries.

**Table 4 – Estimation results by sector for OECD markets**  
*dependent variable log of Italian Exports. .*

	(I)	(II)	(III)	(IV)	(V)
	Low tech	High tech	SITC-6	SITC-7	SITC-8
lch_v_export	-0.794*** (0.0615)	-0.259*** (0.0684)	-0.707*** (0.0873)	-0.566*** (0.0643)	-0.652*** (0.0693)
lit_gdp	-0.208*** (0.0610)	0.172 (0.146)	-0.0347 (0.104)	0.462*** (0.0887)	-0.247*** (0.0805)
lgdp	1.140*** (0.0429)	0.870*** (0.0653)	1.073*** (0.0590)	1.018*** (0.0497)	1.285*** (0.0572)
luvratio	-0.133*** (0.0260)	-0.119*** (0.0390)	-0.00998 (0.0412)	0.00867 (0.0246)	-0.0369 (0.0307)
landlocked	-0.579*** (0.0373)	-0.377*** (0.127)	-1.035*** (0.0711)	-0.940*** (0.0609)	-0.291*** (0.0545)
contig	0.392*** (0.0270)	0.343*** (0.0942)	0.698*** (0.0380)	0.603*** (0.0461)	0.520*** (0.0400)
ldist	-0.540*** (0.0178)	-0.682*** (0.0462)	-0.617*** (0.0271)	-0.622*** (0.0281)	-0.475*** (0.0318)
Constant	-11.48*** (2.085)	-16.44*** (4.531)	-14.88*** (3.583)	-26.50*** (2.945)	-14.78*** (2.339)
Observations	430,786	26,646	145,049	107,660	125,317

Robust standard errors in parentheses

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

Table 4 shows that the competitive pressure from China is widespread. More specifically, the largest impact is on low tech sectors (see columns I and II, where products at 6 digit level of the harmonized system have been classified into high tech and non high tech). Accordingly, among the three sectors considered, those including traditional products (i.e. SITC 6 and 8) have a larger (numerical value of the) coefficient for Chinese exports compared to the relatively more sophisticated sector including machinery and equipment (SITC-7).

As far as the other variables are concerned, we note that the coefficient of the relative unit prices has a positive sign in the machinery and equipment sector. This may suggest that in traditional sectors, despite a growing competitive pressure by Chinese products, Italian exports tend to compete on quality.

Table 5 reports the results of an even more detailed estimation run on a much finer sector division. It only reports the numerical coefficient of Chinese exports in the regressions which were run on selected divisions of the above three sectors<sup>21</sup>. Results confirm that the Chinese competitive effect is widespread. The competitive pressure is higher in the machinery group, including machinery specialized for light industries (SITC-72) and metalworking (73). Conversely, in relatively more sophisticated groups of products included in the telecommunications (SITC-76) and in the SITC-79,

<sup>21</sup> The other coefficients have very stable numerical values with respect to the estimation previously run; results are not reported here for lack of space but are available on request.

which consists of production of more complex vehicles including rails, aircrafts and ships, however, the coefficient has a positive sign.

As expected, the largest impact in the group of consumer goods is in the apparel and clothing division and especially in men and women’s knitted or crocheted goods (SITC-843 & 844) and the articles of apparel (845).<sup>22</sup>

**Table 5. Estimated coefficients of the variable “Chinese Exports” by selected divisions of the SITC classification for OECD markets.**

Description	Division (SITC)	Ch_exports
Leather	61	0.8616***
Paper, paperboard and articles of paper	64	-0.8535**
Textile yarn, fabrics, made-up articles	65	-0.1551*
Non-metallic mineral	66	-0.8924***
Machinery specialized for particular industries	72	-0.9757***
Metalworking machinery	73	-1.0273***
General industrial machinery and equipment	74	-0.3639***
Office machines and automatic data-processing machines	75	-0.9587**
Telecommunications apparatus and equipment	76	0.0783
Electrical machinery	77	-0.5100***
Road vehicles	78	-0.3621***
Other transport equipment	79	0.7888***
Prefabricated buildings, sanitary, plumbing, heating and lighting fixtures	81	0.6065**
Furniture	82	0.0322
Travel goods, handbags	83	-0.1160
Articles of apparel and clothing accessories	84	-0.4998***
Footwear	85	-0.5797
Miscellaneous manufactured articles	89	-0.3516***

#### 4.2.2 Selected Middle up income countries

The same model has been run for the sub-sample represented by countries classified by the World Bank as belonging to the “middle up income” group (Table 6).

<sup>22</sup> Results on more disaggregated groups (up to the three digits of the SITC classification) have not been reported in table 5 for reasons of space. No impact has been found in the clothing accessories (846) and the articles of apparel and clothing accessories of other than textile fabrics (848).

**Table 6. Estimation results by sector for Middle-up income markets:  
dependent variable log of Italian Exports.**

	(I)	(II)	(III)	(IV)	(V)
	Low tech	High tech	SITC-6	SITC-7	SITC-8
lch_v_export	-0.0801*** (0.0224)	0.0176 (0.0687)	-0.0642** (0.0300)	-0.0784*** (0.0283)	-0.634*** (0.0871)
lit_gdp	-0.844*** (0.0412)	-0.529*** (0.162)	-0.787*** (0.0682)	-0.403*** (0.0736)	-0.397*** (0.102)
lgdp	0.613*** (0.0148)	0.696*** (0.0594)	0.555*** (0.0198)	0.824*** (0.0249)	0.952*** (0.0520)
luvratio	0.112*** (0.00866)	-0.0660** (0.0259)	0.163*** (0.0150)	0.0526*** (0.0131)	0.0644*** (0.0189)
landlocked	-0.357*** (0.0192)	-0.162** (0.0740)	-0.453*** (0.0323)	-0.0806** (0.0386)	-0.410*** (0.0410)
ldist	-0.670*** (0.0114)	-0.490*** (0.0323)	-0.781*** (0.0180)	-0.565*** (0.0169)	-0.784*** (0.0247)
Constant	18.20*** (1.320)	5.273 (5.234)	18.75*** (2.121)	0.421 (2.347)	0.203 (3.470)
Observations	355,504	22,034	117,323	100,068	109,641

Robust standard errors in parentheses

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

Compared to OECD markets, the impact of Chinese goods on Italian exports is generally weaker, with the relevant exception of the sector including consumer goods (SITC-8). Also in this case, Chinese exports tend to have an impact on low tech goods, while little or no impact is found on high tech.

Table 7, to highlight the competitive pressure of China, reports coefficients (and statistical significance) of the variable “Chinese exports” for selected branches of consumer goods. Coefficients are significant in the division including furniture, and, most importantly, in apparel and clothing goods. This confirms our *a priori* expectations as well as the findings for high income countries.

**Table 7. Estimated coefficients of the variable “Chinese Exports” by selected divisions and groups of the SITC classification for Middle up income markets.**

Description	Division (SITC)	Coefficient
Prefabricated buildings, sanitary, plumbing, heating and lighting fixtures	81	-0.1178
Furniture	82	-0.1123**
Travel goods, handbags	83	-0.2104
Articles of apparel and clothing accessories	84	-1.1232***
Men's or boys coats, capes, jackets, suits,...not knitted or crocheted	841	-0.2770
Women's coats etc..not knitted or crocheted	842	-0.4367**
Men's or boys coats, capes, jackets, suits,...knitted or crocheted	843	0.8896
Women's or girls coats, capes, jackets, suits,...knitted or crocheted	844	-0.3233**
Articles of apparel, of textile fabrics	845	-0.7739***
Clothing accessories	846	-0.2514***
Articles of apparel and clothing accessories of other than textile fabrics	848	-0.8421
Footwear	85	-0.7216
Professional, scientific and controlling instruments	87	-0.2369**
Photographic apparatus, equipment and supplies and optical goods	88	0.1028
Miscellaneous manufactured articles	89	-0.6795***

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

#### 4.2.3 Does inequality matter?

Results discussed above suggest that, despite the widespread Chinese competitive pressure across high and middle income markets and sectors, there still seem to be a competitive advantage of high quality Italian products, less affected by price competition.

In order to test this, under the assumption that consumers in countries with different income distribution might have different preferences for products where the main difference is linked to quality, we replicate our analysis focusing on countries with different income distribution. As a proxy to measure inequality in income levels,<sup>23</sup> we use the Gini index, widely adopted in the literature. We run a gravity model on sub-samples, identified by a Gini index threshold.

In the literature there is no consensus on a threshold above which a country could be labeled as “unequal”. Sudhir and Segal (2008), for instance, review the recent literature on global interpersonal income inequality but do not explicitly suggest a threshold above which income distribution is considered unequal. Lelkes et al. (2009) and Ward et al. (2010) classify countries as having high levels of inequality if the Gini Index is greater than 0.3. Somehow arbitrarily and without precise reference to a model, Ferreira and Ravallion (2008) refer to a country as highly unequal if it has a Gini index above 0.5. In what follows, as a first approximation we use the simple average of the Gini index for the group of countries included in our sample.<sup>24</sup>

Table 8 below shows the results of model (1) for markets with different levels of inequality. On the full sample including all countries and sectors (average Gini index=0.42), the China effect is higher for countries with a more equal income distribution (column II). In unequal contexts, the Italian (high quality and more expensive) products can more easily be bought by the “rich” (the upper quintile of the distribution) while at the same time (low quality, or cheaper) Chinese goods could be more easily sold to the lowest quintiles. Conversely, in societies where income is more equally distributed, competition is likely to be tougher<sup>25</sup>. This result seems to suggest a polarization of the tails of the distributions, with “rich” and “poor” behaving differently and sticking to their choices.

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<sup>23</sup> Some caveats should be considered when adopting this measure. Gini coefficient do include investment income but, it's based on net income and it does not accurately reflect differences in wealth. For example, Sweden has a low Gini coefficient for income distribution but a significantly higher Gini coefficient for wealth (for instance 77% of the share value owned by households is held by just 5% of Swedish shareholding households). Still, economies with similar incomes and Gini coefficients may have very different income distributions. This is because the Lorenz curves can have different shapes and yet still yield the same Gini coefficient (Atkinson and Brandolini, 2010; Lelkes et al., 2009 )

<sup>24</sup> The values vary between an average of 0.31 for the group of OECD to 0.46 for the group of the “middle-low” countries.

<sup>25</sup> A recent study on a similar line for Italian goods is in ICE, 2010.

**Table 8. Estimation results by different levels of inequality**  
*dependent variable log of Italian Exports.*

	(I)	(II)
	High inequality	Low inequality
lch_v_export	0.0891*** (0.0180)	-0.575*** (0.0870)
lit_gdp	-1.806*** (0.0508)	1.522*** (0.185)
lgdp	0.570*** (0.0115)	0.991*** (0.0547)
luvratio	0.0956*** (0.00741)	0.0137 (0.0155)
landlocked	-0.0678* (0.0353)	-0.209*** (0.0250)
contig		0.0879*** (0.0307)
ldist	-0.452*** (0.0181)	-0.632*** (0.0224)
Constant	43.51*** (1.512)	-55.94*** (6.284)
Observations	116,899	107,769

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5. Conclusions

Over the last decades, China's massive entry into the international market has come at the expense of a large number of countries, and somehow as a surprise, also at the expense of more developed ones. Italy – whose structural composition of exports is based on so-called low tech, “traditional” goods – seems to be one of the developed countries most at risk.

This paper, using a gravity approach, shows that in OECD and in the middle up income countries, markets that account currently for over 85% of Italian exports, there is a significant competitive effect of Chinese exports on Italian exports. This effect seems to be concentrated (at least for the moment and despite the increasing sophistication of Chinese exports) on low tech, traditional products. This paper also shows that higher value added products – especially in traditional sectors and in more advanced markets – are more resilient to the Chinese pressure. Hence, the shifting of the Italian specialization within sectors rather than between sectors seems to have somehow protected Italian goods from a tougher competition from Chinese products, still lagging behind in terms of quality. A likely implication is, therefore, that qualitative upgrading of Italian exports can offset at least part of the competitive pressure coming from China.



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