The pro-competitive effect of imports from China: an analysis on firm-level price data *

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Abstract

It is a widespread idea that the entry of China into world markets has been one of the strongest recent shocks to advanced countries' industrial sectors. This is particularly true for countries like Italy where labor intensive, low-technology productions represent a large share of output. Using Italian manufacturing firm-level data on output prices over the period 1990-2004, we test whether increased import competition from China has affected firm's pricing strategies causing a reduction in prices and markups. After controlling for other price determinants (demand and cost changes, domestic competition and import penetration), we find that this is indeed the case. Instrumenting China's share over Italian total imports with China's world export market share proves the found relationship is of a causal nature. Inspired by and in line with recent advances in international trade theory, we also show that the price effects of Chinese competitive pressure are stronger in less technologically advanced sectors and, within these sectors, for less productive firms.

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1 Introduction

Does product competition from China affect firms' pricing strategies in advanced countries? More precisely, does increased import penetration of Chinese products cause a reduction of firms' (relative) prices and markups? Are these effects stronger in less technologically advanced sectors where price competition is more relevant? And are more productive firms more capable to limit squeezing of prices and margins? We answer positively to all these questions using a unique dataset of Italian manufacturing firm-level price data over the period 1990-2004.

The pro-competitive effect of trade is theoretically well-grounded. According to recent models of international trade with heterogeneous firms (Bernard et al., 2003; Melitz, 2003; Melitz and Ottaviano, 2008), stronger foreign competition and increased imports are followed by price reductions related to both decreases in markups (and profit margins) and increases in average firm productivity (through reallocation effects).

Empirical support to the existence of this effect comes from different strands of literature. Some studies use cross-country panel data to show that trade openness determines productivity growth (among others, see Alcalà and Ciccone, 2004). For developing countries, one-off trade liberalization events are shown to be followed by an intense resource reallocation that brings aggregate productivity growth and reduction in profit margins (Levinsohn, 1993; Harrison, 1994; Krishna and Mitra, 1998; Tybout, 2001; Pavcnik, 2002). These latter studies share the advantage of relying on a relatively exogenous, as a trade liberalization can be, increase in trade openness.

Using US plant-level manufacturing data, Bernard, Jensen and Schott (2006a) show that a reduction of inbound trade costs is indeed positively associated with industry productivity growth, the probability of plant death, the probability of entry of new exporters, and export growth by incumbent exporters. Firm heterogeneity plays the predicted role: the positive impact on plant death is smaller for highly productive and relatively more capital intensive plants. Bernard, Jensen and Schott (2006b) perform a similar exercise using as an external trade shock the sectoral exposure to increasing imports from low-wage countries. They find again that such a measure is positively (negatively) correlated with the probability of plant death (employment growth). Again, these effects are weaker for more productive plants; moreover, plants tend to move away from industries more exposed to low-wage country competition to more capital intensive productions. Chen, Imbs and Scott (2007) use a panel of manufacturing industries in seven European countries during the 1990s and find significant pro-competitive effects of trade openness; in particular, they show that increased imports raised industry productivity, reduced industry markups, (temporarily) slowed down (production) prices. Auer and Fischer (2008) study the effects of import penetration from emerging economies on the US industry and find that sectors more exposed to competition from emerging countries recorded higher productivity growth, as well as lower price inflation. Boulhol et al. (2006) find that import competition reduced markups and workers' bargaining power in the UK manufacturing industry.

Two recent papers focus on China. Bloom, Draca and Van Reenen (2008) use firm-level data from 11 EU countries and show that Chinese import competition reduces employment growth and increases , though to a lesser extent, propensity to adopt ICT and plant exit. Broda and Romalis (2008) take a very different perspective: using US household data on

non-durable consumption for the 1994-2005 period, they find that inflation for poorest households has been 6 percentage points smaller than that for the richest ones thanks to cheaper imported goods. They estimate that China contributed for about a third of the total effect.

This paper contributes to the existing literature in various ways. First, it looks at prices and, contrary to Chen, Imbs and Scott (2007) and Auer and Fischer (2008), it does it using firm-level data. This allows us to complement Bernard, Jensen and Schott (2006a, 2006b) and provide evidence on the price effects of foreign competition. As they do, we distinguish two levels: across industries, testing whether changes in prices and markups are negatively correlated with the intensity of Chinese competition; within industries, testing whether the response to increased competition is heterogeneous across firms as predicted by theoretical models. In the spirit of Chen, Imbs and Scott (2007), our estimates refer to a short run equilibrium, one that does not admit changes in firms' production location.

Second, like Bernard, Jensen and Schott (2006b) we precisely characterize foreign competition by focusing on increased import penetration by low-wage countries. We adopt a more restrictive view and focus only on China for two reasons. On the one hand, our choice makes the external trade shock large and temporally very well-defined: China's entry into world markets has been impressive and has occurred exactly during the time horizon covered by our data (its world export market share has grown from 2.9 in 1990 to 9.2 per cent in 2004). Its potential is still very high. On the other hand, competitive pressures exerted by Chinese products on world markets are considered to be mostly price-based, making particularly relevant to look at price reactions, and concentrated in less technologically advanced sectors (textile, clothing, leather, footwear, furniture), where Italy has typically held comparative advantages.

Third, since firms' price changes are directly recorded through the Bank of Italy's Survey on Italian Manufacturing Firms (INVIND), we overcome the statistical issues plaguing previous papers on price-cost margins[1].

Last but not least, we solve potential endogeneity biases. By instrumenting the Chinese share in Italian total imports with China's world export market share, we deem to focus on push factors related with industrial development and trade policy in China, thus excluding that the evolution of productivity and competitiveness of Italian firms feeds back into our variable of interest.

This paper grazes an issue that has been the object of a vast and quite controversial debate over the last few years: the relationship between globalisation and the worldwide very subdued inflation pattern, despite a buoyant economic activity. Overall, the effect of the increased trade integration of emerging and developing economies on the dynamics and the level of inflation in advanced countries is not clear-cut (Ball, Mankiw and Romer, 1988; Rogoff, 2003; Bean, 2006). On the basis of the same dataset we are using here, Gaiotti (2007) argues that globalisation has not induced a weakening of the link between prices and domestic economic activity, contrary to what claimed by other studies based on more aggregate data (for example, Borio and Filardo, 2007). The lack of convincing evidence that globalisation has exerted a permanent effect on the behaviour of inflation

[1] Due to the lack of better data, the literature has relied either upon accounting figures or upon the estimation method proposed by Hall. Both methods have important drawbacks (Bresnahan, 1987; Tybout, 2001).

or a downward impact on its steady-state level does not, however, contrast with the idea that trade integration, through lower import prices and stronger competitive pressures, can importantly affect pricing policies in some sectors and in some firms within such sectors and hence have an impact on relative prices (Pain et al., 2006, among others).

Our work aims at ascertaining whether globalisation had indeed any effect on the pricing strategies of those firms, in the Italian manufacturing sector, more directly exposed to external competition. In this context, the use of firm-level data allows to capture important differences within sectors that would be lost when using more aggregate data. Our focus is hence on relative price adjustments which can at most affect only temporarily aggregate inflation. Thanks to the methodology adopted, we can abstract from other elements, such as the growth in international raw material prices, that globalisation has also brought about.

We find that increases in the import share of Chinese products have a negative causal impact on firms' price dynamics. This result is obtained in a fully-fledged empirical specification where we account for demand and cost shocks, for domestic and import penetration, for firms' size and productivity and for a large set of year and sector dummies. Results are also robust to different empirical specifications. The size of the effect of the Chinese import share is non-negligible: firms operating in a sector where such a share is 1 percentage point higher turn out to increase prices by 0.2 percentage points less each year, which compares with an average annual price change of 2 percent. Interestingly, we also show that competitive pressures from Chinese imports act not only directly but also indirectly through a lower demand elasticity of prices. We do not find any effect on the wage elasticity of prices, as shown in a different empirical set-up by Rosolia and Venditti (2008). Turning to the theoretical predictions brought forward by recent models of international trade with heterogenous firms, we find that, as expected, Chinese competition exerts stronger pressures in sectors where price competition is more important and on less productive firms. Put together, the two effects also reinforce each other.

A final remark concerns markups. Since our empirical approach would call for a direct measure of markups as a dependent variable and we would incur in all the difficulties of computing a reliable measure from accounting figures, we have chosen not to carry out any analysis on markups. Having said that, we think that the whole set of our control variables, in particular firms' wages and productivity, would allow us to interpret the results as a negative effect of China on Italian firms' markups.

The paper is organized as follows. The next two sections discuss empirical specification and data. Section 4 presents all the results. Section 5 presents an alternative empirical specification. Concluding remarks are left to the last section.

2 Empirical specification

Our aim is testing the relationship between firms' pricing strategies and import competition. For this, we need a fully-fledged specification that includes all the determinants of prices: demand, costs, productivity and market power. In order to identify import competition from Chinese products we want to account for competitive pressures separately from domestic and non-Chinese foreign firms.

In a standard model with imperfect competition a firm's profit maximization brings to

an optimal price that is a markup over marginal costs:

$$p_{i,t} = \mu_{i,t} * c_{i,t}$$

that, after taking logs and first-differencing, becomes:

$$\Delta \log p_{i,t} = \Delta \log \mu_{i,t} + \Delta \log c_{i,t}$$

where we observe $\Delta \log p_{i,t}$ at the firm level and need to proxy for markups and unit costs. For this, we take stock of the rich industrial organization literature (Domowitz et al., 1988; Rotemberg and Woodford, 1992; Haskel et al., 1995; Beccarello, 1996; Marchetti, 2001) and define markups as a function of a time-invariant sector component related to technology and market structure, the level of demand (cyclical markups) (DEM) and competition. For the latter, we distinguish between domestic competition ($DCOMP$) and foreign competition; we further break down foreign competition into Italy's import penetration ($IMPEN$) and the share of Chinese products on Italian imports ($CHINA\_IT$). In line with models of Cournot competition and related empirical evidence, markups are also assumed to be increasing in firm size ($SIZE$). Notationally, after taking logs and first-differencing, thus sweeping away time-invariant sector components, we write:

$$\begin{aligned} \Delta \log \mu_{i,t} \quad = \quad & \alpha_o + \beta \Delta DEM_{i,t} + \gamma_0 \Delta DCOMP_{s,t} + \gamma_1 \Delta IMPEN_{s,t} + \\ & \gamma_2 \Delta CHINA\_IT_{s,t} + \delta \Delta SIZE_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where s indexes the 3-digit NACE sector a firm i belongs to. It is worth noticing, as we will discuss below, that we have a firm-level indicator for demand.

We then model changes in unit costs as follows:

$$\Delta \log c_{i,t} = \alpha_1 + \kappa \Delta \log W_{i,t} + \xi \Delta \log LPROD_{i,t} + \psi_t + \mu_s + u_{i,t} \tag{2}$$

where W is wage, $LPROD$ is value added per worker; year dummies ψ_t capture changes in costs that are common to all firms, while 3-digit sector dummies μ_s control for sector costs.

A large number of studies conducted recently on firms' pricing policies in the euro area, based on both survey and quantitative micro data, suggest that firms do not adjust prices immediately following shocks to both costs and demand but that they tend to do it with a delay (Fabiani et al, 2007). The average frequency at which firms change prices, both in Italy and in other European countries, is once a year. Therefore, we use lagged values of all regressors in our empirical specification.

Before combining equations (1) and (2), it is important to notice that due to the presence of sector fixed effects inherited from equation (2), the inclusion of differences in the sectoral measures of competition would take us to identify the effect of an acceleration rather than an increase in competition (i.e., in the Chinese market share). A way to overcome this problem is using a "mixed model" in which all the sectoral variables in equation (1) are expressed in levels. In this fashion, the coefficients of these variables can be interpreted as the desired effect of deviations of competition intensity from a sectoral mean over all years. Instead, all firm-level variables, entering in differences, must be assessed as deviations from the yearly mean by sector. Thus, we employ the following empirical specification:

$$\begin{aligned}\Delta \log p_{i,t} &= \alpha + \beta \Delta DEM_{i,t-1} + \gamma_0 DCOMP_{s,t-1} + \gamma_1 IMPEN_{s,t-1} + \\ &\quad \gamma_2 CHINA\_IT_{s,t-1} + \delta \Delta SIZE_{i,t-1} + \kappa \Delta \log W_{i,t-1} + \\ &\quad \xi \Delta \log LPROD_{i,t-1} + \psi_t + \mu_s + \eta_{i,t}\end{aligned} \tag{3}$$

As a robustness check, we also test a fully-differenced model (results are presented in section 5).

A key parameter of interest is γ_2, the coefficient of $CHINA\_IT_{s,t-1}$, the Chinese share of Italian imports. This parameter measures the effect of a change in the level of such a share on firms' percentage price changes, controlling for sector and time effects.

An important issue to be addressed is the possible endogeneity of the Chinese import share in Italy. In fact, Chinese products may gain larger market shares in those sectors where Italian firms raise prices more (or decrease prices less). In order to address these concerns, we instrument the variable $CHINA\_IT$ with China's world export market share ($CHINA\_WRL$). Reasonably, this latter variable is not affected by the evolution of Italian firms' productivity and prices but rather by push factors, like industrial development and trade policies in China[2]. On the other hand, the same push factors should render the two variables highly correlated.

A missing control is that of costs different from wages, such as for example the price of materials. As we do not have sectoral proxies for these costs, we account for them econometrically by adding the interaction between year dummies and 2-digit NACE sector dummies, under the assumption that they are common across firms within this sectoral breakdown.

3 Data

Our dataset covers a time horizon of 17 years, from 1988 to 2004, and draws from different sources. Firm-level data are obtained merging the Bank of Italy's Survey on Italian Manufacturing Firms (INVIND) and the Company Account Data Service (CADS). Sectoral trade data are from the OECD-STAN database and the World Trade Analyzer (WTA) database developed by Canada Trade Statistics.

CADS is the organization in charge of gathering and managing firms' account data in Italy. It was established in the early 1980s jointly by the Bank of Italy, the Italian Banking Association (ABI) and a pool of leading banks with the aim of collecting and sharing information on borrowers. Since firms are included in the database if they are granted credit by banks, the sample is biased towards better than average borrowers, those good enough to be granted credit. Moreover, the focus of CADS on the level of borrowing skews the sample towards larger firms and as a consequence towards firms located in the Northern part of Italy. Data are currently available from 1982 through 2005. Balance sheets are re-classified in order to reduce the dependence on accounting conventions used by each firm to record income figures and asset values.

[2] Using the same strategy, Bugamelli and Rosolia (2006) find a causal impact of developing countries' world export market share on Italian sectoral productivity, mostly due to a creative destruction process with the exit of less efficient firms and the entry of more efficient ones.

INVIND is an open panel of about 1,200 firms representative of Italian manufacturing firms with at least 50 employees[3]. INVIND's questionnaires, sent to companies at the beginning of each calendar year and relative to previous year's data, collect information including year of foundation, nationality, location, sector of activity, ownership structure, employment (yearly average), investment (realized and planned), sales (domestic and foreign), capacity utilization rate, indebtdness. Every year the survey is enriched with additional sections covering specific issues. Descriptive statistics for our CADS-INVIND sample are presented in Tables 1 and 2. The sectoral composition is broadly representative of the specialization of the Italian economy, with most firms operating in machine manufacturing, textile, clothing and chemical products. The sample tends to be biased towards relatively large and old firms reflecting the fact that, as stated above, we observe the balance sheets only of those that obtain bank loans. The number of firms is not constant over time, due to the fact that INVIND is an open panel and to the requirement that each firm participates to the survey for at least three years in a row as our firm-level regressors are lagged differences. All in all, as the firms included in the sample may be "better" than average ones, especially able to survive on the market, our analysis may somehow underestimate the effect of Chinese competition, not controlling for firms exiting the market.

Importantly for our work, since 1987 the INVIND survey has been collecting also quantitative information on the percentage change of firms' average output price with respect to the previous year (euro-denominated and independently of destination markets). Table 3 shows the average price change by year across firms; the average across the whole sample period is about 2 percent. The quality of these figures can be appreciated by comparing them with the rate of change of the official industrial producer price index (excluding the energy sector) computed by the Italian National Statistical Office (ISTAT), shown in the rightmost column of the Table. Figure 1 reports the empirical distribution of average price changes in four selected years of the time horizon covered by our data and according to whether the Chinese import share is below or above the median; it shows that price changes are less dispersed for sectors where such a share is higher. These sectors are also characterized by a lower average price change. The Figure also suggests that the price change data contained in our database are reasonable. The first percentile of the distribution corresponds to around -15 per cent and the 99^{th} percentile to about 20 per cent.[4] Price changes are on average larger in 1995, presumably reflecting the devaluation of the Italian lira in that year. In the empirical analysis we control for these time effects and also for the possibility that they are diversified at the 2-digit NACE sector. The largest price increases are reported by firms operating in the metal industry and are concentrated in the years 2003 and 2004 −characterized by sharp rises in raw material prices− and in the years 1993 and 1995 −following currency devaluation episodes. The largest price cuts are concentrated in the metal industry and in the production of paper and of basic chemical products in 1996. All the empirical results reported in the sections below hold, with even larger statistical

[3]Recently the sample has been enlarged in three directions: to industrial non-manufacturing firms, since 1999, to firms with 20-49 employees since 2001, to service sectors (private non-financial sectors like trade, transportation, telecommunication, services to firms) since 2002.

[4]In the whole sample, there are only 21 observations with price increases larger than 40 per cent and 18 observations with price cuts larger than 30 per cent (only 6 larger than 40 per cent). We are not sure that such observations are outliers or errors in the data.

significance, also if we exclude all price changes (positive and negative) larger than 20 per cent.

Our database contains information on the following explanatory variables. Short run changes in firm-level demand (DEM) are proxied by changes in the capacity utilization rate as collected by INVIND. The size of the firm ($SIZE$, measured as the log of the number of employees), unit wages (W, computed as total labor costs divided by the number of employees) and productivity ($LPROD$, computed as value added per employee) are from CADS. The intensity of domestic competition ($DCOMP$) is proxied by a concentration index (the market share of the 4 largest firms in terms of sales) computed on CADS data at the 3-digit level.

Sectoral import penetration ($IMPEN$) in Italy is taken from the OECD-STAN database. Import shares from China ($CHINA\_IT$ and $CHINA\_WRL$) are computed using the WTA database, which provides export and import flows, in current dollars, for a very large set of countries, disaggregated by destination market and type of product. The product breakdown corresponds to the 4-digit SITC-Rev.3 classification. On the basis of these data we also construct the share of Italian and world imports from advanced countries. As firms in our dataset are classified according to the NACE-Rev.1 system, the mapping of the SITC-Rev.3 classification into the NACE-Rev.1 is carried out using the concordance tables provided by UN.

Consistently with previous literature, we exclude a number of specific sectors, either because they are subject to strong government regulation and taxation (tobacco, production of carbon, oil refining, treatment of nuclear waste, corresponding to NACE 160, 231, 232, 233), or because their products are "bulky" so that import data show large spikes in a few years and little movement in others (ship, locomotive or airplanes building, corresponding to NACE 351, 352, 353).

Figure 2 shows the dynamics of the average Chinese import share in Italy and in the world, aggregated across sectors. Both series increase steadily over time, confirming the rise of Chinese competition. The various panels of Figure 3 show the dynamics of the same two series by 2-digit NACE sector. As expected, the Chinese import share is particularly large in clothing, textile, leather goods, and "other vehicles" (NACE 354 and 355).

4 Results

4.1 Base regression

Table 4 presents our base results. All columns include year and sector fixed effects, where the latter are a set of 80 sector dummies (3-digits NACE-Rev.1). Standard errors are robust to heteroskedasticity. The first column shows OLS estimates of equation (3). All the main control variables have the expected signs. An increase in demand and wages raises prices; the same occurs when a firm gains market power as a size increase may signal. For given wages, increases in productivity are negatively correlated with price changes. The effects of import penetration is also negative as expected. The coefficients of the Chinese import share and that of the domestic concentration index competition are instead not significantly different from zero. The elasticity to labour costs (the coefficient of the variable $\Delta W_{i,t}$) is somewhat low, but in line with other estimates using Italian firm-level data (Rosolia and

Venditti, 2008). The coefficient of the variable ΔDEM is not really the demand elasticity, but the capacity utilization elasticity.

As discussed in the previous section, the coefficient of $CHINA\_IT$ could be biased by endogeneity: if the entry of Chinese products is, *ceteris paribus*, more intense in sectors where Italian firms are less price competitive, i.e. where domestic prices increase relatively more, then the endogeneity bias could work against finding a pro-competitive effect of imports from China. Therefore we turn to IV estimation and use China's world export market share as instrument for China's market share in Italy.

Column (2) presents IV results. Our intuition about the potential endogeneity of $CHINA\_IT$ is fully confirmed: now the estimated coefficient is negative and significantly different from zero. Results indicate that, controlling for time and sector effects, firms operating in a sector where the Chinese share of imports is 1 percentage point larger tend to increase prices by 0.2 percentage points less. This represents a sizeable effect, as the average price change across all years and sectors in the sample is 2 percent. The coefficient of the other variables are basically unchanged. It is interesting to notice that the coefficient on the share of Chinese imports is three times as large as that of the whole import penetration, suggesting that Chinese competition is particularly important for Italian firms, due to their sectoral and skill specialization. The F-statistic from the first-stage regression is very large indicating that weak instruments are not a concern.

In the rest of the Table we modify the empirical IV specification in two directions. First, we add interactions between year and 2-digit sector dummies to control for the evolution of costs other than wages (for example, raw material prices). We believe that the sectoral breakdown used in this interaction should suffice under the hypothesis of a high degree of integration within 2-digit sectors, in other words, under the hypothesis that cost increases in the upstream segments are fully passed-through downstream. The results, shown in column 3, hold unchanged. Thus, since this formulation is computationally quite heavy, in the remainder of our empirical analysis we proceed without the interacted dummies.

Second, we test the robustness of the results to clustering of standard errors, by sectors (column 4) and firms (column 5).

4.2 Robustness

Since we aim at capturing the effect of competitive pressures exerted by Chinese products on the Italian market, we should focus on firms' pricing behavior for products sold domestically. In the absence of information on prices broken down by destination market, we perform two indirect tests: i) exclude firms which export more than 30 percent of their total sales; ii) explicitly control for firms' export share. The results are reported in the first two columns of Table 5: in both cases, the size and significance of all coefficients remain broadly unchanged.

No change in results occurs also when we exclude sectors where the Chinese market share shows extreme values (column 3), or sectors where our sample includes less than 5 or 10 firms each year (columns 4 and 5).

As a test of internal validity, we check whether the same results hold through using a different measure of competitive pressures, one that in theory should be radically different from the Chinese import share and therefore give very different results. We use the Italian import share from advanced countries under the hypothesis that pressures exerted by such

countries on domestic producers do not take the form of price competition. When instrumenting it with the analog computed on world export flows, we find no effect on Italian price changes (Table 6). This is always the case whether we add year-sector dummies (column 2) or allow for clustering of standard errors (columns 3 and 4).

4.3 Demand and wage elasticity

Imports from China could exert their pressure on Italian firms' pricing not only directly but also indirectly through a lower price elasticity to demand and wages. We test this by adding two interaction terms, between the Chinese share (appropriately instrumented) on one side and ΔDEM and $\Delta \log W$ on the other. That is,

$$\begin{aligned} \Delta \log p_{i,t} \quad = \quad & \alpha + \beta \Delta DEM_{i,t-1} + \beta_1 \Delta DEM_{i,t-1} * CHINA\_IT_{s,t-1} + \\ & \gamma_0 DCOMP_{s,t-1} + \gamma_1 IMPEN_{s,t-1} + \gamma_2 CHINA\_IT_{s,t-1} + \\ & \delta \Delta SIZE_{i,t-1} + \kappa \Delta \log W_{i,t-1} + \\ & \kappa_1 \Delta \log W_{i,t-1} * CHINA\_IT_{s,t-1} \\ & + \xi \Delta \log LPROD_{i,t-1} + \psi_t + \mu_s + \eta_{i,t} \end{aligned} \tag{4}$$

Here we would expect β_1 and κ_1 to be negative, so that in the face of fiercer price competition from imports of Chinese products, Italian firms raise prices less when demand or wages increase. We find that this is indeed the case only for demand: in column (1) and (3) of Table 7 the coefficient of this interaction term is negative and significantly different from zero. This suggests that the elasticity of prices to changes in capacity utilization (our proxy for changes in demand) is smaller for firms operating in sectors where the share of imports from China is larger[5]. On the contrary, we find no significant effect on the wage elasticity of prices (columns 2 and 3).

4.4 Heterogeneity across sectors and firms

Is the price effect of China's competitive pressures different across sectors and firms? Providing an answer to this question represents not only a way of testing theoretical predictions but also a further indirect test à la Rajan-Zingales (1998) on the plausibility of the causal relationship we are identifying.

Sectors are heterogeneous along many dimensions. Since we focus on firms' price reactions, a dimension we might want to look at is the type of competition prevailing within a given sector. To simplify things, we test the following hypothesis: are competitive pressures from cheap Chinese products stronger in sectors where the competition game is played more on price than on non-price factors (e.g., product quality and differentiation)? To this aim, we need to split sectors according to a criterion that mimics the prevailing type of competition. As a first approximation, we use the Pavitt (1984) sectoral classification that distinguishes four product categories (science-based, specialized suppliers, scale-intensive,

[5] Notice that, combining the direct and indirect effect, the demand elasticity of prices is typically positive, as the share of imports from China is on average around 3 percent, although we can not exclude that in some sector-year it becomes negative.

traditional) according to a decreasing propensity to innovate[6]. We then assume that the higher the sectoral propensity to innovate, the less price-based is competition within the sector.

Since very few sectors fall into the science-based category even at the 3-digit breakdown, we create a unique highly innovative category containing science-based and specialized suppliers. We then test the following modified equation (3)

$$\begin{aligned}\Delta \log p_{i,t} \quad = \quad & \alpha + \beta \Delta DEM_{i,t-1} + \gamma_0 DCOMP_{s,t-1} + \gamma_1 IMPEN_{s,t-1} + \\ & \gamma_2 CHINA\_IT_{s,t-1} * TR_s + \\ & \gamma_3 CHINA\_IT_{s,t-1} * SI_s + \gamma_4 CHINA\_IT_{s,t-1} * HTS_s \\ & \delta \Delta SIZE_{i,t-1} + \kappa \Delta \log W_{i,t-1} + \xi \Delta \log LPROD_{i,t-1} + \psi_t + \mu_s + \eta_{i,t}\end{aligned} \tag{5}$$

where $TR/SI/HTS$ is a dummy equal to 1 for traditional/scale-intensive/science-based+specialized suppliers and 0 otherwise. Here we would expect that $|\gamma_2| > |\gamma_3| > |\gamma_4|$.

Recent advances in international trade theory with heterogeneous firms suggest a second test: more productive firms should be less sensitive to Chinese competition, that is:

$$\begin{aligned}\Delta \log p_{i,t} = & \alpha + \beta \Delta DEM_{i,t-1} + \gamma_0 DCOMP_{s,t-1} + \gamma_1 IMPEN_{s,t-1} + \\ & \gamma_2 CHINA\_IT_{s,t-1} + \gamma_3 CHINA\_IT_{s,t-1} * LPROD_{i,t-1} + \\ & \delta \Delta SIZE_{i,t-1} + \kappa \Delta \log W_{i,t-1} + \xi \Delta \log LPROD_{i,t-1} + \psi_t + \mu_s + \eta_{i,t}\end{aligned} \tag{6}$$

where we would expect γ_3 to be positive. Finally, we nest these two models and test whether the differential effect in terms of productivity is stronger in more exposed sectors.

The results in Table 8 support all three hypotheses. According to the only sectoral split (column 1), import competition from China is relevant only for firms in traditional and scale intensive sectors; it is instead absolutely absent in the most innovative category.

More productive firms contain price changes less in response to Chinese competitive pressures (column 2). In particular, for a firm in the top decile of the productivity distribution, γ_3 is -0.134, while it is -0.256 for a firm in the bottom decile. This implies that for the same increase in the share of imports from China, a firm in the bottom decile of the productivity distribution increases prices by 0.25 percentage points less (for example, by 1.75 percent rather than by 2 percent), while a firm in the top decile raises prices by 0.13 percentage points less. This effect derives entirely from traditional and scale intensive sectors as shown in columns 3 and 4.

[6]Pavitt (1984) used data on about 2,000 "significant" innovations in Britain from 1945 to 1979. For each of these innovations, covering 3- and 4-digit product groups, Pavitt had detailed information on firms' characteristics (e.g., size, sector of activity), the source and the nature of technology, and the type of innovation (process vs. product). These features were used to group industries into four categories that, in an increasing order of 'innovation propensity and technological sophistication' are: *traditional sectors* (e.g., textiles, leather, footwear) that have low propensity to in-house R&D and low engineering skills; industries dominated by *specialized suppliers* (mechanical and instrument engineering) that focus mainly on product innovation and a small- and medium-sized production scale; *scale-intensive* sectors (food, metal manufacturing, shipbuilding, motor vehicles, glass and cement) that have high level of R&D targeted at process innovation and large firms; *science-based industries* (chemicals, electrical and electronic engineering) where firms spend a lot in R&D (so called high-tech sectors).

5 An alternative empirical specification

In this section we present and discuss the results from the fully-differenced model, that is:

$$\begin{aligned}\Delta \log p_{i,t} &= \alpha + \beta \Delta DEM_{i,t-1} + \gamma_0 \Delta DCOMP_{s,t-1} + \gamma_1 \Delta IMPEN_{s,t-1} + \\ &\gamma_2 \Delta CHINA\_IT_{s,t-1} + \delta \Delta SIZE_{i,t-1} + \kappa \Delta \log W_{i,t-1} + \xi \Delta \log LPROD_{i,t-1} + \psi_t + \mu_s + \eta_{i,t}\end{aligned} \quad (7)$$

This version of the model includes both firm-level and industry-level variables in lagged first differences. As noted in Section 2, it is important to include sector fixed effects in the specification for the difference in costs, in order to capture sectoral trends in cost changes. The presence of sector fixed effects implies that if the Chinese share of Italian imports is included in differences and not in levels, the regression captures the effect of an acceleration in such a share on price changes. Thus, the main purpose of this section is to show that results hold also in the fully differenced version of the model.

We estimate equation 7 both through OLS and through 2SLS, using the (Δ) share of Chinese exports on the world market as instrumental variable. Results, presented in Table 9, are in line with those of the "mixed" model described in Table 4 above. The coefficient of $\Delta CHINA\_IT$ is -0.93, implying that a 1 percent change in the Chinese import share, equal to 0.34 on average, induces a 0.3 percentage points decrease in the average annual price change, in line with what estimated in the mixed model. The other coefficients are broadly similar to those in the mixed model[7]. We do not include interacted year-sector dummies as now they would capture most of the variation in the change in the Chinese import share and make the identification of its effect quite hard. The last three columns of Table 9 report robustness checks. Column 3 excludes firms with an export share on total sales larger than 30 percent. Column 4 includes a control for a firm's export share and column 5 excludes extreme values in the share of imports from China. Results hold in all three cases[8]. Tables 10 and 11 report the same robustness checks performed in the case of the mixed model, showing that results are remarkably robust. Table 10 confirms that the effect of Chinese competition in moderating firm price changes is stronger, demand elasticity is reduced, while Table 11 indicates that Chinese competition impacts traditional sectors, while it has little impact on specialized hi-tech and on scale-intensive sectors. This result is somewhat different from what found for the mixed model (see Table 8), where Chinese competition impacts on both traditional and scale-intensive sectors. Overall it can be concluded that the main results of the paper hold also in the fully differenced model.

6 Concluding remarks

We show that competitive pressures exerted by Chinese products on international markets impact on Italian firms' pricing strategies, softening, *ceteris paribus*, price increases and

[7] All results hold when allowing for clustering at the firm level (column 4), while the differenced lagged share of Chinese imports becomes not statistically significant, although still negative, when clustering at the sector level (column 3).

[8] We run regressions to check that the share of imports from advanced countries has no effect on prices, as done in Table 6 and results are analogous to those from the mixed model.

lowering the elasticity of prices to demand shocks. Having included in the empirical specification a whole set of controls related to costs and productivity, we can confidently conclude that Chinese competition ends up reducing firms' markups.

This paper is therefore the first empirical test of the predictions of the most recent models of international trade with heterogeneous firms based on firm-level data. Moreover, since we find that the pro-competitive effect is stronger on less productive firms, we are implicitly unveiling (from an empirical perspective) the whole chain of effects following a trade liberalization as depicted by the theoretical models. That is, more foreign competition forces price and profit reductions that are stronger for less productive firms; as a consequence, these firms will get closer to their break-even until they exit and give a start to the reallocation process that leads to sectoral productivity improvements.

The paper also contributes to the debate on the crisis of the Italian manufacturing industry. After the strong Italian lira depreciations in 1992 and 1995, the economy entered a profound and long stagnation phase: labor productivity did not grow, TFP stagnated or decreased, world export share reduced more than for the other main euro area countries. As the crisis was particularly evident in traditional sectors (textile and clothing, leather and shoes, furniture) where Italy holds strong (revealed) comparative advantages, many commentators pointed to the increased trade integration of China as one of the main causes. This paper contributes to this debate suggesting that the reallocation of market shares induced by Chinese competition will at the end bring sectoral productivity increases.

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Tables

Table 1: Descriptive statistics: sample means

	1990	1995	2000	2004
number of employees	593	553	415	301
number of employees (median)	259	219	173	127
firm age (years)	40	40	37	35
sales (mln. euro)	76.1	114.3	103.3	82.3
value added per worker (thous. euro)	34.9	50.5	56.0	58.3
wage (thous. euro)	22.3	30.4	32.9	36.2
export/sales (percentage, only exporters)	32.7	37.8	39.9	40.4

Table 2: Number of observations by year and sector

year	no.		**sector**	no.
1990	266		Cars	108
1991	320		Chemical Goods	528
1992	348		Clothing	526
1993	385		Electric Equipment	152
1994	386		Food and Drinks	803
1995	410		Furniture	349
1996	439		Information Processing Equipment	43
1997	424		Iron and Steel	258
1998	495		Leather Goods	348
1999	456		Machine Manufacturing	1,136
2000	471		Medical and Optical Equipment	67
2001	480		Metal Products	302
2002	594		Other Vehicles	44
2003	713		Paper	227
2004	624		Products from non metal minerals	684
			Publishing	171
			Rubber Products	386
			TV and Communication Equipment	41
			Textile	479
			Wood Products (excl. Furniture)	159

Table 3: Percentage price change by year: INVIND vs national statistics (ISTAT)

year	INVIND	ISTAT production prices
1990	3.65	NA
1991	2.73	3.3
1992	2.23	1.9
1993	2.76	2.9
1994	3.84	3.9
1995	6.96	8.4
1996	0.20	3
1997	0.78	0.9
1998	0.41	0.9
1999	-0.23	-0.1
2000	3.08	3.5
2001	2.01	1.4
2002	1.08	1.1
2003	1.04	1.2
2004	2.26	3.0
average	2.05	2.52

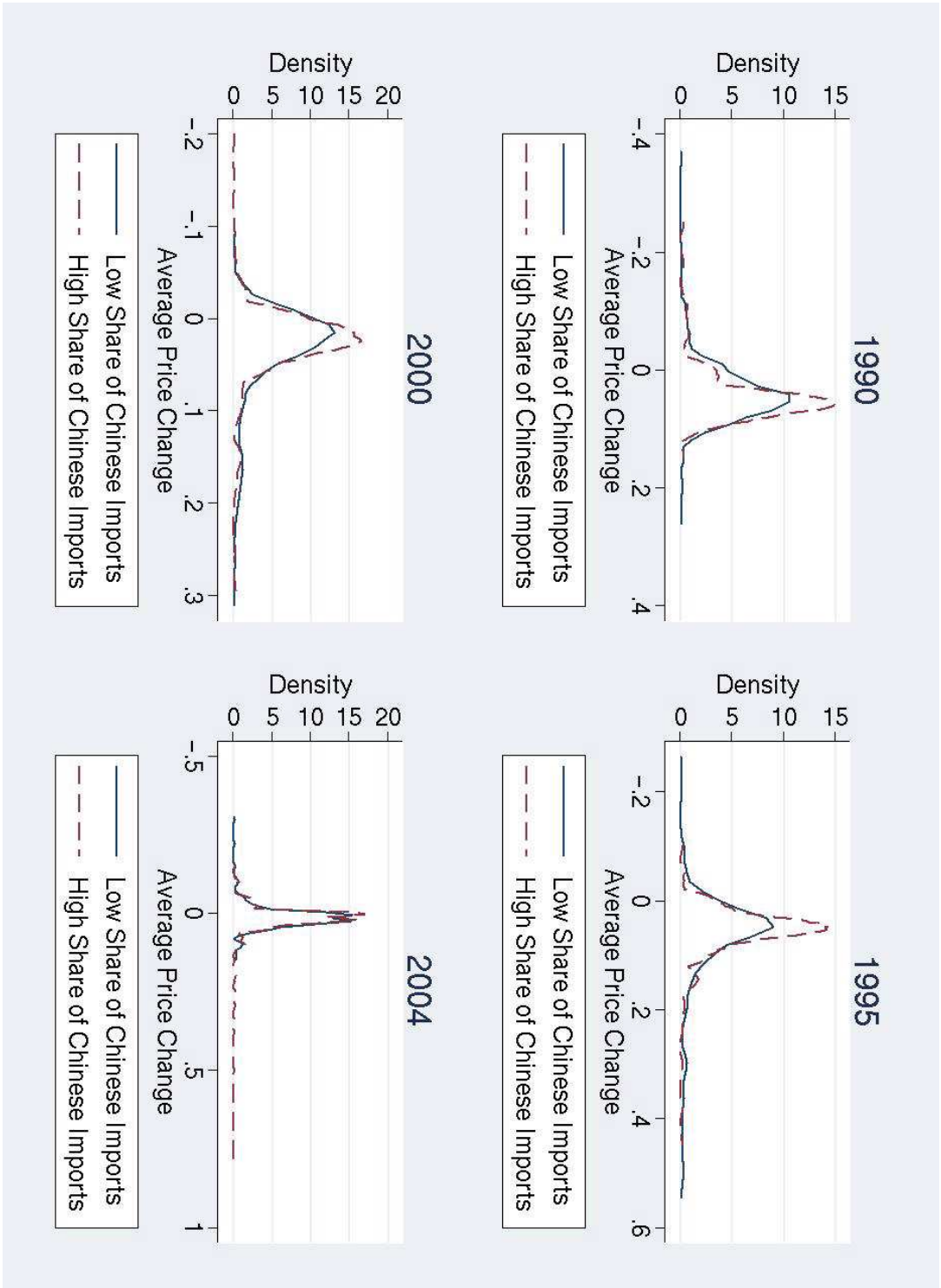

Figure 1: Average Price Changes.

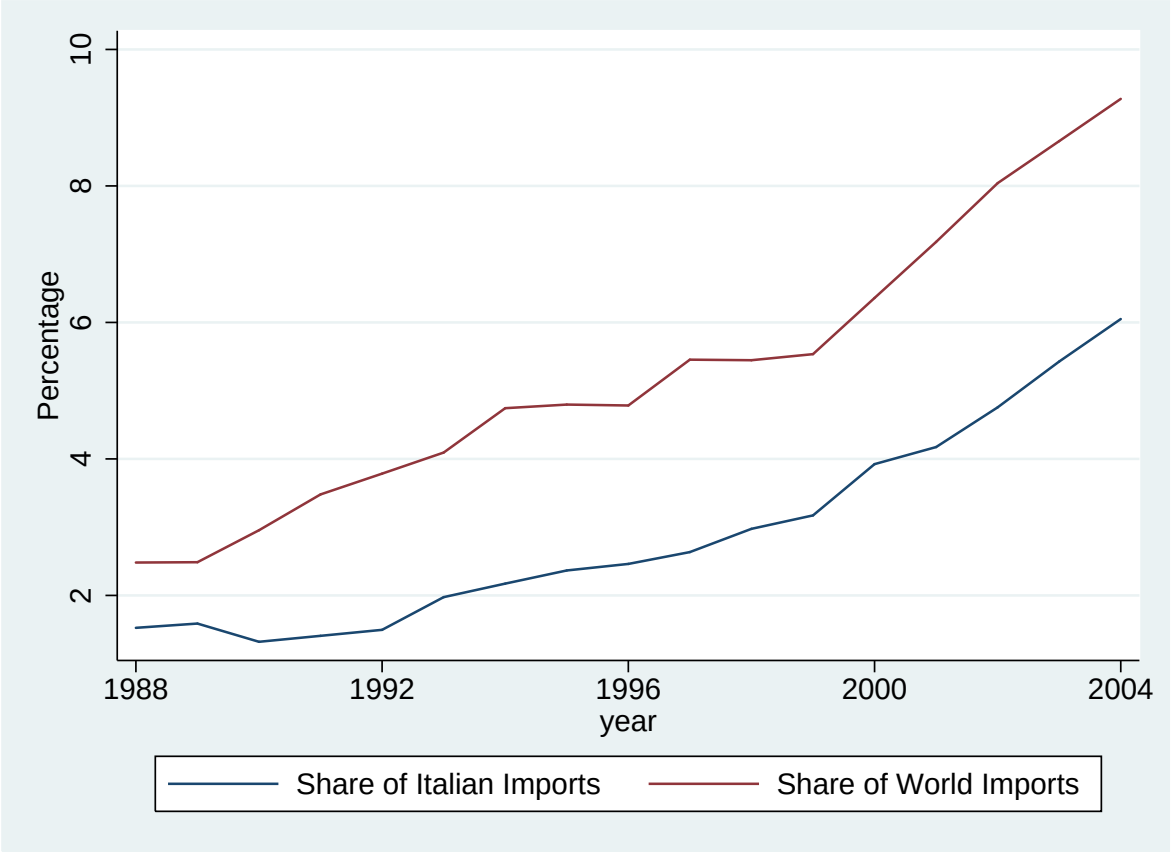

Figure 2: Share of Italian and World Imports from China

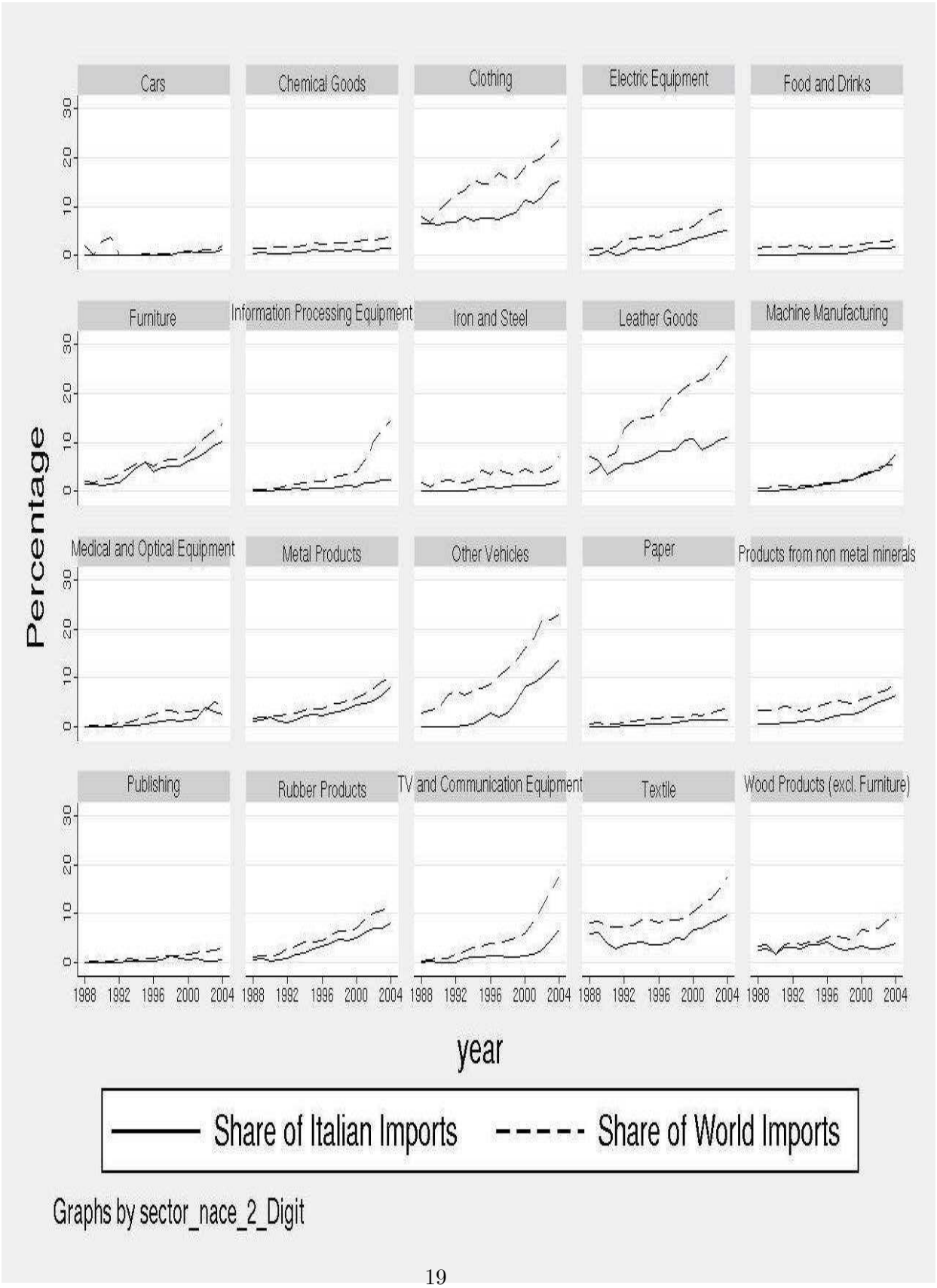

Figure 3: Share of Italian and World Imports from China by NACE 2 Digit Sectors

Table 4: Base Regression

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. Column 3 includes year-sector (2 digits) dummies. Column 4: clustering of standard errors at the sector level. Column 5: clustering of standard errors at the firm level.

	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV
$CHINA\_IT_{s,t-1}$	-0.03	-0.175***	-0.183**	-0.175*	-0.175**
	(0.04)	(0.067)	(0.079)	(0.095)	(0.078)
$IMPEN_{s,t-1}$	-0.05**	-0.041**	-0.062**	-0.041**	-0.041**
	(0.02)	(0.019)	(0.027)	(0.020)	(0.020)
$DCOMP_{s,t-1}$	0.01	0.006	0.010	0.006	0.006
	(0.01)	(0.008)	(0.009)	(0.013)	(0.008)
$\Delta DEM_{i,t-1}$	0.02**	0.016**	0.010	0.016**	0.016**
	(0.01)	(0.007)	(0.007)	(0.008)	(0.006)
$\Delta SIZE_{i,t-1}$	0.07**	0.074**	0.072**	0.074**	0.074**
	(0.04)	(0.036)	(0.034)	(0.034)	(0.035)
$\Delta \log W_{i,t-1}$	0.01***	0.008***	0.007***	0.008***	0.008***
	(0.00)	(0.002)	(0.002)	(0.002)	(0.002)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.001**	-0.000	-0.001**	-0.001**
	(0.00)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	6811	6807	6807	6807	6807
R^2	0.13	0.13	0.26	0.13	0.13
F-Statistic		953.42	508.9	24.62	383.39

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

Table 5: Robustness

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates. Column 1 excludes firms with an export share (on total sales) larger than 30 percent. Column 2 includes a control for firms' export share. Column 3 excludes extreme values in the import share from China. Column 4 excludes sectors with less than 5 firms. Column 5 excludes sectors with less than 10 firms.

	(1)	(2)	(3)	(4)	(5)
$CHINA\_IT_{s,t-1}$	-0.19**	-0.17***	-0.19**	-0.17**	-0.18*
	(0.09)	(0.07)	(0.08)	(0.08)	(0.10)
$IMPEN_{s,t-1}$	-0.06**	-0.04**	-0.03*	-0.04*	-0.04*
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
$DCOMP_{s,t-1}$	0.01	0.01	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.03***	0.02**	0.01**	0.01**	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.00	0.07**	0.08**	0.08**	0.10**
	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
$\Delta \log W_{i,t-1}$	0.01**	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00	-0.00**	-0.00**	-0.00**	-0.00**
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
$CHINA\_EXPSHARE_{s,t-1}$		0.00			
		(0.00)			
Observations	3402	6807	6486	6440	5368
R^2	0.13	0.13	0.13	0.12	0.12
F- Statistics	562.08	956.38	1057.3	902.48	794.56

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

Table 6: Advanced countries' market share

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates. Column 2 includes year - sector (2 digits) dummies, Column 3: clustering of standard errors at the sector level, Column 4: clustering of standard errors at the firm level.

	(1)	(2)	(3)	(4)
$ADVANCED_{s,t-1}$	-0.01	-0.013	-0.01	-0.01
	(0.02)	(0.023)	(0.03)	(0.02)
$IMPEN_{s,t-1}$	-0.05***	-0.057**	-0.05**	-0.05**
	(0.02)	(0.027)	(0.02)	(0.02)
$DCOMP_{s,t-1}$	0.01	0.010	0.01	0.01
	(0.01)	(0.009)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.02**	0.010	0.02**	0.02***
	(0.01)	(0.007)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.07**	0.070**	0.07**	0.07**
	(0.04)	(0.034)	(0.03)	(0.04)
$\Delta \log W_{i,t-1}$	0.01***	0.008***	0.01***	0.01***
	(0.00)	(0.002)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.000	-0.00**	-0.00**
	(0.00)	(0.000)	(0.00)	(0.00)
Observations	6811	6811	6811	6811
R^2	0.13	0.27	0.13	0.13
F- Statistic	1133.9	721.7	106.58	651.7

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

Table 7: Indirect effect

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates.

	(1) Demand	(2) Wage	(3) Demand and wage
$CHINA\_IT_{s,t-1}$	-0.17***	-0.17***	-0.17***
	(0.07)	(0.07)	(0.07)
$\Delta DEM_{i,t-1} * CHINA\_IT_{s,t-1}$	-0.39**		-0.39**
	(0.19)		(0.20)
$IMPEN_{s,t-1}$	-0.04**	-0.04**	-0.04**
	(0.02)	(0.02)	(0.02)
$DCOMP_{s,t-1}$	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.03***	0.02**	0.03***
	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.07**	0.07**	0.08**
	(0.04)	(0.04)	(0.04)
$\Delta \log W_{i,t-1}$	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.00**	-0.00**
	(0.00)	(0.00)	(0.00)
$\Delta \log W_{i,t-1} * CHINA\_IT_{s,t-1}$		-0.01	0.01
		(0.10)	(0.10)
Observations	6807	6807	6807
R^2	0.13	0.13	0.13
F-Statistic $CHINA\_IT_{s,t-1}$	477.08	478.7	319.55
F- Statistic $\Delta DEM_{i,t-1} * CHINA\_IT_{s,t-1}$	557.76		374.12
F- Statistic $\Delta \log W_{i,t-1} * CHINA\_IT_{s,t-1}$		6.06	19.94

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

Table 8: Heterogeneous Effects

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates. Column 1 distinguishes the effect between Traditional (TR), Scale Intensive (SI) and Hi-Tech Specialized (HTS) sectors, according to Pavitt classification. Column 2 contains an interaction between Chinese share and productivity. Column 3 adds a triple interaction: Chinese share - productivity - sector (traditional, scale intensive - HiTech/Specialized). Column 4 adds year - sector (2 digits) dummies to the specification in column 3. F- Statistics not reported due to space constraints: they suggest weak instruments are not a concern.

	(1)	(2)	(3)	(4)
$CHINA\_IT_{s,t-1} * TR$	-0.18**		-0.26***	-0.18
	(0.08)		(0.09)	(0.18)
$CHINA\_IT_{s,t-1} * SI$	-0.16**		-0.72***	-0.60***
	(0.08)		(0.20)	(0.17)
$CHINA\_IT_{s,t-1} * HTS$	-0.07		-0.11	-0.06
	(0.10)		(0.14)	(0.17)
$IMPEN_{s,t-1}$	-0.04**	-0.04**	-0.04**	-0.07*
	(0.02)	(0.02)	(0.02)	(0.03)
$DCOMP_{s,t-1}$	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.02**	0.02**	0.02**	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.07**	0.08**	0.07*	0.07**
	(0.04)	(0.04)	(0.04)	(0.04)
$\Delta \log W_{i,t-1}$	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.00**	-0.00***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
$CHINA\_IT_{s,t-1}$		-0.31***		
		(0.08)		
$CHINA\_IT_{s,t-1} * \log LPROD_{i,t-1}$		2.09***		
		(0.63)		
$CHINA\_IT_{s,t-1} * \log LPROD_{i,t-1} * TR$			1.27**	1.30**
			(0.61)	(0.57)
$CHINA\_IT_{s,t-1} * \log LPROD_{i,t-1} * SI$			10.00***	7.04***
			(3.35)	(2.44)
$CHINA\_IT_{s,t-1} * \log LPROD_{i,t-1} * HTS$			0.40	1.37
			(1.63)	(1.68)
Observations	6807	6561	6561	6561
R^2	0.13	0.13	0.13	0.27

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

Table 9: Differenced model and Robustness

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. Column 3 excludes firms with an export share (on total sales) larger than 30 percent. Column 4 includes a control for firms' export share. Column 5 excludes extreme values in the import share from China.

	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV
$\Delta CHINA\_IT_{s,t-1}$	0.09	-0.93**	-1.64**	-1.10**	-0.87*
	(0.08)	(0.47)	(0.73)	(0.52)	(0.46)
$\Delta IMPEN_{s,t-1}$	-0.00	-0.00	-0.03*	-0.00	0.00
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
$\Delta DCOMP_{s,t-1}$	-0.01	-0.01	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.02**	0.02**	0.03***	0.02***	0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.07**	0.08**	0.01	0.08**	0.08**
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
$\Delta \log W_{i,t-1}$	0.01***	0.01***	0.01**	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.00***	-0.00	-0.00***	-0.00***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
$\Delta CHINA\_EXPSHARE_{s,t-1}$				0.01	
				(0.01)	
Observations	6785	6785	3394	6474	6471
R^2	0.13	0.11	0.10	0.10	0.12
F statistic excluded instr.		116.08	76.72	103.51	196.71

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

Table 10: Differenced model - Indirect Effect

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates.

	(1)	(2)	(3)
$\Delta CHINA\_IT_{s,t-1}$	-1.30**	-1.17**	-1.18**
	(0.56)	(0.56)	(0.57)
$\Delta DEM_{i,t-1} * \Delta CHINA\_IT_{s,t-1}$	-0.49***		-0.52***
	(0.16)		(0.18)
$\Delta IMPEN_{s,t-1}$	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)
$\Delta DCOMP_{s,t-1}$	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.04***	0.02***	0.04***
	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.11**	0.11**	0.10**
	(0.05)	(0.05)	(0.05)
$\Delta \log W_{i,t-1}$	0.01**	0.02**	0.02**
	(0.00)	(0.01)	(0.01)
$\Delta \log LPROD_{i,t-1}$	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)
$\Delta \log W_{i,t-1} * \Delta CHINA\_IT_{s,t-1}$		-0.20	-0.18
		(0.14)	(0.14)
Observations	5091	4931	4918
R^2	0.10	0.10	0.11
F-Statistic $\Delta CHINA\_IT_{s,t-1}$	54.68	54.19	36.27
F- Statistic $\Delta DEM_{i,t-1} * \Delta CHINA\_IT_{s,t-1}$	634.42		665.173
F- Statistic $\Delta \log W_{i,t-1} * \Delta CHINA\_IT_{s,t-1}$		23.49	46.97

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

Table 11: Differenced model - Heterogenous Effects

Robust standard errors in parentheses. All regressions include year and sector (3 digits) dummies. All columns display IV estimates. Column 1 distinguishes the effect between Traditional (TR), Scale Intensive (SI) and Hi-Tech Specialized (HTS) sectors, according to Pavitt classification. Column 2 contains an interaction between Chinese share and productivity. Column 3 adds a triple interaction: Chinese share - productivity - sector (traditional, scale intensive - HiTech/Specialized). Column 4 adds year - sector (2 digits) dummies to the specification in column 3. F- Statistics not reported due to space constraints: they suggest weak instruments are not a concern.

	(1)	(2)	(3)
$\Delta CHINA\_IT_{s,t-1} * TR$	-2.07**		-5.20***
	(0.97)		(1.97)
$\Delta CHINA\_IT_{s,t-1} * SI$	-0.57		-0.22
	(0.59)		(0.88)
$\Delta CHINA\_IT_{s,t-1} * HTS$	-0.37		-0.16
	(0.52)		(0.78)
$\Delta IMPEN_{s,t-1}$	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)
$\Delta DCOMP_{s,t-1}$	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.01)
$\Delta DEM_{i,t-1}$	0.02**	0.02***	0.02**
	(0.01)	(0.01)	(0.01)
$\Delta SIZE_{i,t-1}$	0.08**	0.08**	0.08**
	(0.04)	(0.04)	(0.04)
$\Delta \log W_{i,t-1}$	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)
$\Delta \log LPROD_{i,t-1}$	-0.00**	-0.00***	-0.00**
	(0.00)	(0.00)	(0.00)
$\Delta CHINA\_IT_{s,t-1}$		-1.11*	
		(0.64)	
$\Delta CHINA\_IT_{s,t-1} * \Delta \log LPROD_{i,t-1}$		2.05	
		(9.10)	
$\Delta CHINA\_IT_{s,t-1} * \Delta \log LPROD_{i,t-1} * TR$			47.69*
			(27.01)
$\Delta CHINA\_IT_{s,t-1} * \Delta \log LPROD_{i,t-1} * SI$			-7.50
			(8.54)
$\Delta CHINA\_IT_{s,t-1} * \Delta \log LPROD_{i,t-1} * HTS$			-1.39
			(2.89)
Observations	6785	6540	6540
R^2	0.10	0.11	0.08

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