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THE IMPACT OF CHINESE IMPORT COMPETITION ON ITALIAN MANUFACTURING

by Luca Citino* and Andrea Linarello*

Abstract

This paper documents the effects of increased import competition from China on the Italian labour market. In line with recent studies (Autor et al., 2013, 2014), we take two complementary approaches and study the effects on both local labour markets and manufacturing workers. Our analysis shows that Italy's local labour markets, which were more exposed to Chinese trade because of their industry composition, ended up suffering larger manufacturing and overall employment losses. Nevertheless, back-of-the-envelope calculations suggest that the aggregate effect on total manufacturing employment is modest. At the individual level, contrary to what has been documented for many developed countries, workers initially employed in more exposed manufacturing industries did not suffer long-term losses in terms of lower earnings or more discontinuous careers. While they were indeed less likely than other similar workers to continue working in manufacturing, they were also able to carry out successful transitions towards the non-tradable sector, in other areas with better job opportunities.

JEL Classification: F14, F16.
Keywords: import competition, Italy, China, manufacturing, worker mobility.
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Contents

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1 Introduction[1]

China's economic growth in the last 30 years has been unprecedented. Thanks to a series of market-oriented reforms started in the late 70s, and culminated with the WTO accession in 2001, it came to be the second largest world economy and biggest manufacturing producer. In recent years, a growing literature has quantified the effect that such an economic rise has had on the labour markets of developed economies, mostly via international trade (see Autor et al. (2016) for a review). While a robust finding from this line of work is that the "China shock" has displaced manufacturing jobs and deteriorated the careers of incumbent manufacturing workers, the margins of adjustment and the workers' transitions towards other parts of the economy seem to be country specific.

In this paper we investigate the impact of increased Chinese import competition, during the 1991-2007 period, on the Italian labor market. Our analysis takes two complementary approaches. In the first part of the paper we make use of Italian Census data and the Italian Statistical Register of Active Enterprises (ASIA), to look at the effects of Chinese trade from the perspective of local labor markets (LLMs). Here we follow the methodology used by Autor et al. (2013) and investigate whether areas specialized in industries subsequently hit by Chinese competition lost more manufacturing jobs in the 1990s and 2000s. In the second part of the paper we take advantage of administrative matched employer-employee data to examine the careers of a subpopulation of individuals who were employed in manufacturing at the start of the 1990s, this time following the work of Autor et al. (2014). We ask whether those individuals who in 1991 were working in industries subsequently more exposed to Chinese import competition were more likely to lose their job in the following years and, if so, whether they were able to carry out successful job transitions towards other firms, in and out of the manufacturing sector. Our focus on incumbent workers in 1991, long before China enter the WTO, has the advantage of allowing us to better control for the endogenous selection of workers into different manufacturing industries and to let us study long-run outcomes.

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We find that LLMs traditionally specialized in import-competing sectors see a decrease in manufacturing employment, with no counterbalancing increase in the non-tradable sector. In the aggregate, however, this fall is modest in size. If we compare the evolution of the share of working-age population employed in manufacturing over the period 2001-2007 of two areas respectively at the 75th and at the 25th percentile of our import competition measure, we see that the former experiences a differential decrease of about 0.6 percentage points, a 5.3% fall in relative terms. Following the methodology developed in Autor et al. (2013), a back-of-the-envelope calculation reveals that the "China shock" would have displaced around 24,000 jobs during the 1991-2001 period and 119,000 jobs during the 2001-2007 period. While China can account for about one fifth of the overall manufacturing decline (630,000 jobs) observed in the period, these figures are very modest if one considers that the number of individuals employed in manufacturing stood at 5.1 million in 1991.[2]

We are not the first to find muted effects of Chinese import competition on manufacturing employment. In other European countries such as France, Germany and Norway, the number of manufacturing jobs lost because of Chinese import competition stands between 1 and 4% of 1995 manufacturing employment. The same number is close to 9% in the US and 14% in Spain (Table A.1). A more detailed comparison between the Italian and the US case reveals that the difference in the overall effects stems from a higher *marginal* impact of import competition in the US. While Italian local labor markets experienced bigger increases in Chinese competition compared to their US counterparts, this was not enough to compensate for the greater sensitivity of US employment to such competition.

Unfortunately, due to data limitations, we cannot provide a definite answer as to why the marginal effect appears lower in Italy. Nonetheless, we provide some suggestive evidence about two possible mechanisms that could play a role. The first one relates to specific institutional features of the Italian labor market. For example, short-time work (STW) schemes might have helped firms to hoard labor in face of the "China shock", reducing separations. Similarly, employment protection legislation (EPL), particularly stringent in Italy during these years, could have deterred firms from cutting employment.[3] While we fail to detect any effects of EPL, we provide some evidence that import-competing sectors made more use of STW after 2001. Quantitatively, however, the increase in STW represents just a small fraction of the overall decline in hours worked, and thus it is

[2]Authors' calculations based on the 1991 Istat Census.

[3]STW schemes are subsidized reductions in working hours that reduce firms' labor cost, while preserving workers' wages, with very high replacement rates.

not likely to be the main reason behind the muted employment effects we find in this paper. The second one is related to the Italian industry composition. A decomposition of the overall impact into industry-level effects, developed in Goldsmith-Pinkham et al. (2018), shows that in Italy negative employment changes are mainly driven by the textile and clothing sectors, inclusive of footwear. In the US, instead, the same effect is driven by consumer electronics, integrated circuits, toys and furniture. This is suggestive that Italy has remained relatively shielded from the rising import competition in consumer electronics and integrated circuits that characterized the US over the same period (Bloom et al., 2019).

Our individual-level analysis reveals that those manufacturing workers employed in more exposed industries in 1991 were subsequently more likely to terminate their work relationship at their initial employer and move out of manufacturing altogether. Quite interestingly though, we also find that such workers did not spend more time into non-employment, nor earned less than other similar individuals when in work. This is because they were more likely to carry out successful transitions, predominantly towards unskilled labor intensive industries within the non-tradable sector.[4] In addition, we document that part of these job moves can be explained by increases in geographical mobility. To the best of our knowledge we are the first to find a response along this margin.

Overall our results suggest that while the rise of China has certainly implied concentrated employment losses in some local labor markets and some industries, this was not enough to cause an overall decline in manufacturing employment in Italy. As a matter of fact, even though the manufacturing share of employment has witnessed a steady decline during the last fifteen years, Italy has experienced only a limited fall in the absolute number of people working in manufacturing, compared to other developed countries. Moreover, workers' transitions out of manufacturing were helped by sustained employment growth in the non-tradable sector, which characterized Italy during those years. While the manufacturing employment share of working-age population has decreased by 1.4 p.p. during the 1991-2007 period, the non-tradable share went up by 9.0 p.p., leading to an overall rise of the employment rate of 7.6 p.p..[5] Correspondingly, the unemployment rate has been on a declining path from the late 1990s until the onset of the Great Recession, reaching 6% in 2007.[6]

[4] In order to classify non-tradable industries we employ the Eurostat "knowledge-intensive" definition.

[5] Authors' calculations based on Istat Census data and Italian Statistical Register of Active Enterprises.

[6] IStat (2019)

Our paper contributes to the growing literature on the effects of Chinese import competition on the labor markets of developed economies. At an aggregate level, all existing studies document negative employment effects. However, some important differences emerge in terms of size. In Spain, Donoso et al. (2015) find employment effects much larger than Autor et al. (2013) found in their seminal paper on the US. They rationalize this with the presence of labor market rigidities that do not allow wages to respond to trade shocks. To the contrary Balsvik et al. (2015) find attenuated effects of Chinese competition in Norway, with job destruction being limited to few thousands units. For France, Malgouyres (2017) also finds smaller effects compared to the US, although bigger than in Norway. A peculiar case is represented by Germany. Dauth et al. (2014) find that while areas specialized in import-competing industries lost employment, this was more than compensated by gains in areas specialized in export-oriented industries. The latter led to a gain of approximately 300,000 jobs that would not have otherwise arisen. In Portugal Cabral et al. (2018) and Branstetter et al. (2019) find muted effects on the domestic market, but strong effects on export markets. Previous literature on the Italian case has pointed out that industries hit by import competition from low-wage countries lost employment compared to other manufacturing industries and that this is especially true in low-skill and labor intensive industries (Federico, 2014). In our paper, we are able extend the analysis and to look at the local labor market and the individual level margins of adjustment to trade shocks.

At the individual level, the general consensus so far reached is that the "China shock" has adverse consequences on workers' careers, mostly due to the partial inability of transferring industry-specific skills to other sectors. For the US, Autor et al. (2014) find negative effects on earnings, but not on the number of years with positive earnings. While workers of all skill levels are equally likely to separate from their initial employer, low-skilled workers are the hardest hit, because they keep churning among exposed industries and find it hard to transition to the services sector. Higher-skilled workers, instead, are able to move out of manufacturing, with no apparent loss in earnings. Qualitatively similar results have also been found for Germany (Dauth et al., 2018) and Denmark (Utar, 2018), where the service sector can account for the majority of the transitions towards new employers. In contrast to previous papers, we find that displaced workers were able to complete successful job transitions in industries whose skill requirements were supposedly close enough to those needed in their previous jobs. This has mitigated the otherwise negative impact of increased international competition on the time spent in employment as well as on cumulative earnings.

The paper is organized as follows: in Section 2 we describe our data sources. In Section 3 we describe how we construct our measure of import exposure and detail our IV strategy. In Sections 4 and 5 we report our analyses at the local labour market and individual level, respectively. In Section 6 we conclude.

2 Data and measurement

For the purpose of this study we combine data from different sources. International trade data comes from UN Comtrade and Eurostat. The former contains import flows at the product level classified at the 6-digit HS level, for over 170 countries, starting from 1991. Since the data for Italy and some other EU countries are not present for 1991 in Comtrade, we integrate it with data from Eurostat. We convert ECU-valued trade flows from Eurostat into dollars using the average nominal ECU/$ exchange rate for 1991. We also deflate all import values so that they are expressed in 2007 dollars at constant prices. We aggregate product-level data to the level of 4-digit ISIC rev. 3 industries, using the concordances provided by Eurostat-RAMON. Domestic production data, needed to construct import penetration measures at the 4-digit level, comes from the Unido-INDSTAT4 database. In the remainder of the paper the term "industry" refers to 4-digit classifications and the term "sector" to 2-digit classifications.

China's share of world exports in goods soared from 2% in 1990 to about 15% in 2015. As for Italy, real imports from China have also been rising during the whole period. They increased from 3.1 billion USD in 1991 to 28 billion USD in 2007 (see also Figure 1), while total imports rose from 235 billion USD to 395 billion USD. This implies that the share of Chinese imports in total imports went from 1.3% to 7.1%. While in 1991 China was the Italy's 15th trading partner by volume of imports, it was the 3rd in 2007. An important feature of this exceptional growth is the high degree of variation across sectors. Table 1 reports 1991-2007 changes in the import penetration ratio and employment shares in total manufacturing employment for 22 2-digit sectors. The greatest increase in import penetration occurred in sectors linked to textile and furniture, while industries that experienced the lowest increase are in the food and beverage sectors. The three most exposed sectors constituted 19.1% of the total manufacturing employment in 1991, indicating that Italy was relatively specialized in those sectors subsequently hit by Chinese competition.[7] In 2007, the same three 2-digit sectors accounted for 15.8% of total

[7]If there was no correlation between import exposure and initial specialization we would expect that

manufacturing employment, which approximately corresponds to a 1/5 decrease.

In the regional analysis, our unit of interest is the local labor market (LLM). We obtain information on LLMs from the National Institute of Statistics (Istat). LLMs are groups of municipalities with strong commuting ties, and are similar to commuting zones in the US.[8] In 1991, Istat grouped Italy's 8,101 municipalities in 784 local labor markets. For each LLM we collect employment data by industry in 1981, 1991 and 2001 from the Manufacturing Census and in 2007 from the Italian Statistical Register of Active Enterprises (ASIA).[9] In order to match industry employment data to international trade data, we convert all employment-related variables from the original NACE classification to the ISIC Rev. 3 classification up to the level of 4 digits. In order to construct demographic and socio-economic control variables at the LLM level in 1991, we draw information from the Population Census at the municipality level. We report descriptive statistics in Table 2, panel (a). Similarly to other developed economies, manufacturing employment as a share of working age population has been declining in the last two decades. However, employment growth in the non-tradable sector has led the overall employment rate to rise markedly, more than in other OECD countries.

In the worker-level analysis, we focus on the subpopulation of manufacturing workers who were employees of manufacturing firms in 1991. We draw information on their career before and after 1991, and up to 2007 from the Italian Social Security Institute (INPS). We rely on a matched employer-employee dataset covering the universe of workers from the population of privately employed individuals in Italy. Public sector, farming and self-employment are not present in the dataset. For each job spell in every year we observe worker and firm identifiers, together with gross earnings, number of weeks worked in full time equivalent units, part-time status and a coarse occupational code (apprentice, blue collar, high-skilled blue collar, white collar, middle manager or manager). For each worker we also observe a series of basic demographic characteristics such as gender, year of birth and place of birth. As for their firms, we observe 4-digit industries and municipality for each establishment.[10] We select a sample of approximately 700,000 workers born

the first three sectors occupy $(100/22) \times 3 \times 100 = 13.6\%$ of total manufacturing employment.

[8]For more details about the methodology, see ISTAT. (1997) and Coppola and Mazzotta (2005).

[9]ASIA is yearly updated through a process of integration of administrative and statistical sources. The increasing availability of timely administrative data increased substantially its reliability and in 2011 it replaced the general Census of manufacturing. Given the high quality of the data, the two data sources are highly comparable.

[10]Our definition of an establishment is based on the *matricola contributiva* in the INPS dataset, that is the level at which firms pay social security contributions. For a given firm a *matricola* includes a set workers whose activities can be attributed to a unique 4-digit industry, and the set has organizational and managerial autonomy.

between 1952 and 1970. During the period under study (1991-2007), these individuals were between 21 and 55 years old. We exclude individuals born in earlier cohorts because industry specific retirement patterns may act as a confounder. We restrict our attention to workers with high labor market attachment, who had a year-round job in the manufacturing sector in 1991, but were also employed the whole time in the three years before. In Table 2, panel (b), we display descriptive statistics. Out of the 192 months between 1991 and 2007, the average worker spent 157 months in employment, cumulatively earned 15 times her initial average annual salary, and earned an average of 1.14 her initial annual earnings for every 12 months spent in employment One-third of our sample is made of females, while 70% is made of blue collar workers. Only 2% of these individuals were born abroad. In the years from 1988 to 1991, the average worker was earning a mean salary of $\exp 10.6 \approx 23,000$ euros and experienced a wage growth of around 9%.

3 Empirical strategy

Our empirical strategy closely follows recent work by Autor et al. (2016). We exploit variation in the growth of Italian imports from China across narrowly defined manufacturing industries. For each industry j our measure of the increase in exposure to Chinese competition is the change in the import penetration ratio:

$$\Delta IP_{jt}^{ITA} = \frac{\Delta M_{jt}^{ITA}}{Y_{j,91} + M_{j,91} - X_{j,91}}, \tag{1}$$

where ΔM_{jt}^{ITA} is the real change in Italian imports from China in industry j between period t and $t-1$; $Y_{j,91}$ is domestic production in 1991; $M_{j,91}$ is total imports in 1991 and $X_{j,91}$ is total exports in 1991. Import penetration captures the fraction of Italian domestic consumption (for goods produced in j) accounted for by Chinese producers. It can also be seen as the market share in sales that China occupies in the Italian market.

We use this measure in two different ways. In Section 4 we apportion industry-level changes as in equation 1 to LLMs, depending on their initial employment shares in such industries. Our aim there is to investigate how local exposure to import competition translates into declines of manufacturing and overall employment at the local level. In Section 5, instead, we attribute industry-level changes directly to individual workers, depending on the industry of their employer in 1991. There we are interested in studying the adverse consequences of international trade on job biographies and explore the margins

of adjustment that workers have, to recover from an increase in trade exposure.

One could be concerned that the measure in 1 is correlated with unobserved industry shocks in Italy, which also explain employment dynamics. This would prevent identification by means of simple OLS.[11] In order to obviate to this issue we employ an instrumental variable strategy aimed at isolating changes in Chinese trade that are due to productivity improvements in China, rather than domestic industry shocks. Consistently with the recent literature (Acemoglu et al., 2016; Autor et al., 2016, 2014, 2013) we instrument the measure in equation 1 with an analogous one that replaces changes in Chinese exports to Italy with changes in Chinese exports to other developed countries (OC). This is equal to:

$$\Delta IP_{jt}^{OC} = \frac{\Delta M_{jt}^{OC}}{Y_{j,91} + M_{j,91} - X_{j,91}} \tag{2}$$

The intuition behind the relevance of this instrument is that a series of structural reforms in China have increased its productive capacity in a specific set of industries where the economy had a comparative advantage. As a consequence China started exporting more in these industries across a wide variety of destinations. In order for this instrument to be valid, it must be that common patterns in Chinese trade across developed economies do not reflect correlated demand or technology shocks across high income countries. Although we cannot rule this out completely, we choose our set of high-income countries so that this risk is minimized. We select all countries used in Autor et al. (2013), with the inclusion of the US, but exclude European countries, where Italian exports and trade flows are concentrated. Therefore, our countries include: The US, Australia, Canada, Japan and New Zealand. Import flows that are common between Italy and this set of countries are more likely to capture the common Chinese supply-side component rather than a correlated demand component.

In Figure 2 we start exploring graphically the relationship between changes in import penetration from China and the evolution of Italian manufacturing employment. Each line represents the employment level for industries divided into quartiles of exposure to Chinese

[11] Say that technological improvements in a given industry allows Italian firms to sell more goods at lower prices. This could independently affect both Italian firms' labor demand and consumer demand for Chinese goods, biasing the OLS coefficient. The sign of the bias would depend on what exactly happens to labor demand (which could increase or decrease following the technological improvement) and to consumer demand for Chinese goods (which could decrease or increase depending on whether the goods are substitute or complements).

competition between 1991 and 2007.[12] The figure reveals, in a non-parametric way, several interesting features of the data. First, as reported in Table 1, Italian manufacturing employment was highly concentrated in those industries where China later become a world leader. The orange line, indicating employment in the most exposed industries, stands above all the others throughout the observation period. Second, overall manufacturing employment did not experience a substantial decline during our period of analysis. All the lines, except for the top quartile of exposure, are mostly flat. Third, aside from the third quartile, these industries appear on parallel trends in the 1990s. The only visible trend break appears in the most exposed industries after 2001. The figure is thus already suggestive of concentrated employment losses, limited to those industries that were most exposed to Chinese competition.

4 Local labor market evidence

Our aim in this section is to understand the relationship between changes in import competition from China and changes in manufacturing employment, which we measure as the share of working age population employed in manufacturing, at the local labor market level. Our empirical strategy, first developed in Autor et al. (2013), uses a Bartik-type measure where nation-wide industry changes in import penetration are apportioned to LLMs via initial local employment shares in those industries. The design exploits variation in the initial specialization of LLMs to generate variation in exposure to Chinese competition. Our measure of exposure is:

$$\Delta IP_{it}^{ITA} = \sum_{j} \frac{L_{ij,1991}}{L_{i,1991}} \Delta IP_{jt}^{ITA}, \tag{3}$$

where ΔIP_{jt}^{ITA} is the change in import penetration between period t and $t-1$ for industry j. $L_{ij,1991}$ is employment in industry j in LLM i in 1991, while $L_{i,1991}$ is total private non-agricultural employment in LLM i in 1991. The cross-sectional variation in ΔIP_{it}^{ITA} comes from two sources: (a) differences in the initial manufacturing share of employment[13] and, (b) differences in the industry mix within manufacturing. In our preferred specification

[12] We measure exposure as predicted values of a simple bivariate "first stage" regression of the variable in equation 1 against the variable in equation 2.

[13] Imports from China consist almost exclusively of manufacturing goods. Given this fact, consider a situation where ΔIP_{jt} is constant and equal to k for every industry j in the manufacturing sector. Then $\Delta IP_{it} = k \cdot L_{i,1991}^{m} / L_{i,1991}$, where $L_{i,1991}^{m}$ is total manufacturing employment. It follows that the shock is higher by contruction in those LLMs with higher employment share in manufacturing in 1991.

we always control for the share of manufacturing employment in 1991, so that the cross-sectional variation only comes from differences in industrial composition across areas with similar manufacturing intensity. By means of their initial specialization, some LLMs experienced marked increases in import penetration, while others remained relatively shielded from it. The interquartile range of our import penetration measure is 0.6 p.p. during the 1991-2001 period and 2.7 p.p. during the 2001-2007 period.

In Figure 3 we present heatmaps of both changes in the share of working-age population employed in manufacturing and changes in the import penetration ratio, for the 2001-2007 period. Both changes are first residualized against the start-of-period share of manufacturing employment. The hardest-hit areas are concentrated in the North-East (Veneto) and Center (Tuscany and Marche). In the North-West (Piemonte) and vast part of the South (Campania, Molise, Basilicata), competition was lower. We now turn to our estimating equation:

$$\Delta Y_{it} = \alpha_r + \gamma_t + \beta \Delta IP_{it}^{ITA} + X'_{i,'91}\delta + \epsilon_{it}, \tag{4}$$

where our main outcome of interest is the change in the share of working-age individuals who work in manufacturing; α_r are 20 "NUTS 2" region fixed effects; $X'_{i,'91}$ is a vector of LLM-level controls measured in 1991, namely the female employment rate and the share of manufacturing employment in private non-farm employment; ϵ_{it} is an error term.[14] We estimate Equation 4 in long differences, stacking the two periods 1991-2001 and 2001-2007. We normalize variables to decade-equivalent changes[15], and include a decade dummy (γ_t). Unless otherwise specified, all regressions are weighted by start of period working-age population. We cluster standard errors at the LLM level to account for serially correlated shocks over time within areas. The differenced specifications net out unobservable time-invariant LLM characteristics, which explain the level of manufacturing employment. Our specification in long differences measures long-run changes and should not be affected by year-to-year volatility in manufacturing employment or trade flows.

[14]Contrary to Autor et al. (2013), we do not have good measures of education and the incidence of routine occupations at the local level. These controls are aimed at capturing changes in technology that may be correlated with import exposure and explain the evolution of manufacturing employment. To obviate to this lack of measurement we try to control for these factors indirectly, by using (twenty) region fixed effects, under the assumption that these characteristics do not vary extensively across local labor markets in the same region. We also try specifications with region × decade fixed effects and show that results are similar.

[15]This involves multiplying both the dependent variable and the ΔIP measures by 10/6 in the second period (2001-2007). The estimated effects are almost identical without the adjustment. Results are available upon request.

As described in Section 3, one possible concern when estimating Equation 4 by OLS, is that ΔIP_{it}^{ITA} could be correlated with the error term because of domestic industry-specific shocks. In order to obviate to these problems we instrument our measure in 3 with:

$$\Delta IP_{it}^{OC} = \sum_{j} \frac{L_{ij,1991}}{L_{i,1991}} \Delta IP_{jt}^{OC}, \tag{5}$$

that is an analogous measure that replaces changes in Chinese exports to Italy with changes in Chinese exports to a subset of other developed countries (OC), listed in Section 3. In the next section we present the results from our analysis.

4.1 Chinese trade and manufacturing employment

Table 3 presents the main results of the local labor market analysis. In Panel (a) we report 2SLS estimates of the effect of Chinese import competition on the share of working-age individuals employed in manufacturing. Corresponding first-stage estimates and Kleibergen-Paap (K-P) F statistics are displayed in Panel (b).[16] In all specifications we detect a negative and strongly significant effect of increases in import competition on the manufacturing share. The coefficient associated with the ΔIP_{it}^{ITA} variable in column (1) of panel (a) indicates that, over a decade, a percentage-point increase in import penetration from China is associated with a 0.253 percentage points decline in the share of working age individuals working in manufacturing.[17] In column (2) we introduce 20 regional dummies, meant to capture unobserved differential trends in employment dynamics. During this period, the manufacturing share in working age population was growing more in the South of Italy compared to the North, mostly because of increases in labor force participation, traditionally low in the South. The introduction of geographic dummies partially attenuates the size of our effect of interest, which still remains strong and significant. Compared to specification in column (2), column (3) further adds to the analysis demographic and economic controls measured in 1991, which may independently affect the manufacturing share at the LLM level. Both the share of manufacturing employment and the female employment share are strong predictors of the decline in manufacturing. However the coefficient on our variable of interest decreases only by 1/4 compared to column (2) and remains highly significant. Finally, in column (4) we estimate our model with the full set of controls but without weighting for working age population in the LLM

[16] Table A.2 in the Appendix reports OLS estimates of the same specifications.

[17] The level of the share in 1991 was 11.66%, so this implies a 1.7% change.

at the beginning of the period. The main results are unaffected, suggesting the results are not driven by a few and very large LLMs. In order to probe the robustness of our results, in column (5) and (6) we also include region-by-decade fixed effects, with or without population weights. While the coefficient is smaller, it is still statistically significant. Across all columns, first stage estimates suggest a very strong and statistically significant relationship between our endogenous variable and the instrument. First stage estimates are very stable across specifications.

In order to assess the relative contribution of China in explaining changes in Italian manufacturing employment, we employ a back-of-the-envelope calculation developed in Autor et al. (2013). [18] Our preferred specification to carry out this exercise is the one in column (3). On the one hand it is more comparable to the main specification in Autor et al. (2013), against which we benchmark our results. On the other hand we want to make sure that the size of the overall effects we find is not driven by the choice of a relatively small estimate from Table 3. Our coefficient of interest in column (3) indicates that, over a decade, a percentage point increase in the share of domestic spending that falls on Chinese goods lowers the share of working age individuals employed in manufacturing by 0.146 percentage points. Since the average local labor market saw a real increase in Chinese import penetration of 0.7 percentage points between 1991 and 2001, and of 3.5 percentage points in the six years between 2001 and 2007, we obtain that Chinese import competition would have reduced the manufacturing share in working age population by 0.1 (0.146×0.7) percentage points in the first period and 0.51 (0.146×3.5) percentage points in the second period. Since the overall change in such share has been -0.55 percentage points in the first period, and -0.89 percentage points in the second period, we obtain that China could account for 18% (0.1 over 0.55) of such decrease in the first period, and 58% (0.51 over 0.89) in the second period.

As highlighted in Autor et al. (2013), this benchmarking exercise may overstate the share of the decline that is attributable to China. While $\hat{\beta}_{2SLS}$ reflects the causal effect of an increase in China's productive capacity on Italian manufacturing, ΔIP_{it}^{ITA} reflects both supply and demand changes. Insofar increases in import demand by Italian consumers have less negative effects on employment, our calculation would overstate China's contribution to the decline in Italian manufacturing. Same as in their paper, we rescale the

[18] The key assumption behind this exercise is that the cross-sectional differences across LLMs that we have estimated mainly reflect absolute declines in the number of jobs. Migration across areas or other general equilibrium effects constitute potential threats to the validity of this exercise. In Section 4.2 we show that population counts do not respond to the "China shock".

effects multiplying them by the share of variance in ΔIP_{it}^{ITA} accounted for by ΔIP_{it}^{OC}.[19] We find this share to be 61% in our sample. This implies that China can account for 11% of the Italian manufacturing decline in the 1991-2001 period and for 35% of the decline in the 2001-2007 period. Multiplying these shares by 1991 working age population would imply a loss of around 23,700 jobs in the first period and a loss of 119,400 jobs in the second period. We will discuss how these effects compare to those in other studies in Section 4.4.

An additional concern with our empirical strategy is that the rise in imports in specific industries could be a consequence of the fall in employment in those same industries in Italy. While the IV strategy already aims at addressing these concerns, we probe our results with an additional set of analyses. We regress 1981-1991 (past) changes in manufacturing employment against 1991-2001 and 2007-2001 (future) changes in import penetration, properly instrumented. This amounts to check whether areas subsequently hit by Chinese competition were already trending differently in previous decades. In Table 4 we show the results. While in some instances the absolute value of point estimates is greater than that of our main effects, we fail to find any statistically significant relationship between past employment dynamics and Chinese trade. Areas later hit by Chinese competition were not on a significantly different trend beforehand.

4.2 Other labour market outcomes at the local level

The effects of trade with China on employment could also materialize in other sectors. On the one hand there could be employment reallocation towards the non-tradable sector. This reallocation channel predicts that bigger decreases in the share of manufacturing employment should cause an increase in the share of non-manufacturing employment, with no net effect on total employment. On the other hand if the local negative demand shock depresses local consumption, employment could fall also in the non-tradable sector, further depressing employment at the local level. In this setting, areas hit by Chinese competition may become less attractive and lose population out of migration responses.

We use slight modifications of the estimating equation in 4 to shed light on these different adjustment mechanisms. In Table 5 we study three different outcomes: the number of people employed in the non-tradable sector over working age (15-64) population, the total number of people working over working age population and, finally the log change

[19] The details of this calculation are presented in the Theory Appendix of Autor et al. (2013).

in working age population. Results in Table 5 suggest that in those LLMs that were more exposed to Chinese trade, the decline in manufacturing employent (column 1) was not compensated by an increase in employment in the non-tradable sectors (column 2). Given that working age population did not change in response to increased competition (column 4) total private non-farm employment in those LLMs fell (column 3).

4.3 The "indirect" effects of Chinese and Eastern European trade on local labor markets

As recently documented for the case of Portugal (Cabral et al., 2018; Branstetter et al., 2019), the substitution between domestic production and import from China is only one possible channel through which the China shock could affect domestic employment. The substitution between exports from Italy and from China to third-country markets – an "indirect" effect – could also be relevant in some circumstances. To test for this possibility, in this section we examine alternative definitions of import competition. First, we augment our domestic import competition measure so that it also includes exposure to Chinese exports in Italian export destinations. Second, we also consider the inclusion of competition from Eastern European countries, both domestically and in export markets. Following the EU accession in 2004, imports from these countries increased substantially and could have had an impact on manufacturing employment.

As for the "indirect" effects of Chinese competition, we consider Italian exposure in 9 European destinations for which we have consistent data from 1991 to 2007. These countries are: France, Germany, Netherlands, Denmark, Ireland, Greece, Portugal, Spain and Finland, which in 1991 accounted for 49% of all Italian exports. Closely following the approach of Autor et al. (2013), we measure exposure to "indirect" competition from China using initial Italian exports divided by the destination's imputed spending on industry output.[20] At the industry level, our new measure of the change in import penetration, accounting for both domestic and indirect effects is:

$$\Delta IPind_{jt}^{Ch} = \frac{\Delta M_{jt}^{ITA} + \sum_{c=1}^{9} \omega_{jc}^{91} \cdot \Delta M_{jt}^{c}}{Y_{j,91} + M_{j,91} - X_{j,91}} \tag{6}$$

[20]We refer to Section VI in their paper. Same as they do, we impute domestic expenditure by 4-digit industry in each country c by applying Italian expenditure shares to overall domestic consumption in destination c. As noted in their paper, this imputation holds exactly if preferences are Cobb-Douglas with country-invariant parameters.

where ΔM_{jt}^{ITA} is real change in Italian imports from China in industry j between period t and $t-1$ and ΔM_{jt}^{c} is the analog for export destination c (both expressed in 2007 USD). ω_{jc}^{91} represents the share of destination c spending on industry j goods that falls on Italian (exported) goods. We keep this share fixed to its value in 1991. The denominator is the usual Italian domestic consumption on industry j goods in Italy.[21]

We build our instrument for equation 6 by replacing country specific import flows with Chinese exports to the set of non-European developed countries described in Section 3 (Australia, Canada, Japan, New Zealand, United States). At the local labor market level (i), we apportion the industry-level measure in 6 through local employment shares. We find that $\Delta IPind_{it}^{Ch}$ is only 17% higher than the domestic competition measure used in Section 4.1. Autor et al. (2013) detect a remarkably similar pattern in the US, where the augmented measure is 21% higher than the domestic one. This stems from the fact that in both countries the expenditure fraction that foreign countries devote to Italian (or US) goods is quite small.

As for import competition from Eastern European countries, we augment our import competition measure, so that it also includes imports from the set of countries that entered the EU during the 2004 enlargement. These are Cyprus, Estonia, Latvia, Lithuania, Malta, Poland, Czech Republic, Slovakia, Slovenia and Hungary. Same as above, we consider both domestic import competition and "indirect" competition in third markets. Our final measure, including both Chinese and Eastern European import competition can be concisely written as:

$$\Delta IPind_{jt}^{Chn+Est} = \Delta IPind_{jt}^{Chn} + \Delta IPind_{jt}^{Est}, \tag{7}$$

where $\Delta IPind_{jt}^{Chn}$ is defined as in equation 6 and $\Delta IPind_{jt}^{Est}$ is defined analogously, but replacing imports from China with imports from Eastern European countries. The measure in equation 7 is apportioned to local labor markets and instrumented in the usual way.

In Table 6, we report 2SLS estimates for the local-labor market analysis, either using our baseline measure of domestic competition (column (1)), or our augmented measure of domestic plus "indirect" Chinese import competition (column (2)) or our augmented

[21] Same as in the rest of our paper, we depart slightly from the original Autor et al. (2013) formulation and normalize everything by *domestic consumption* in a given industry rather than employment. This yields import *penetration* measures rather than import *per worker*, an established metric in the more recent literature Autor et al. (2016).

measure of domestic plus "indirect" Chinese and Eastern European competition (column (3)). We find that the coefficients of interest are slightly smaller than the one in column (1), but remain statistically significant at the 1% level and in the same ballpark. When including "indirect" competition, Autor et al. (2013) find similar patterns for the US case. Intuitively, since import penetration measures are *positively* correlated across countries, we are just "scaling up" the import penetration measure for the same change in manufacturing employment, yielding a lower coefficient. As for foreign competition from other low-wage countries, Autor et al. (2013) also find that their inclusion (Mexico and Central America in their case) does not fundamentally alter the estimated effects. All in all, we conclude that our baseline specifications are robust to the inclusion of indirect import competition from China and Eastern Europe.

4.4 Why are effects small?

According to Autor et al. (2013), the "China shock" can account for the loss of about 1.5 million jobs in the US over the 1991-2007 period, that is 8.9% of total US manufacturing employment in 1995. Compared to the figures in Autor et al. (2013), perhaps surprisingly, similar studies of the effects of the "China shock" in European countries have found much more muted effects of Chinese import competition on manufacturing employment.

In Table A.1 we compare similarly-constructed figures for selected OECD countries on which studies are available. For all countries the figures are always obtained through the back-of-the-envelope calculation developed in Autor et al. (2013).[22] In Italy, France, Germany and Norway, the number of jobs lost represents between 1% and 4% of 1995 manufacturing employment, reflecting a striking similarity in the magnitude of the response. Among European countries with available studies, only Spain represents an exception with a decline of almost 14%.[23]

In terms of the econometric model employed in these studies, differences in these figures could be explained either by the fact that US local labor markets were more exposed to Chinese import competition (higher ΔIP_{it}), or that the marginal effect of each p.p. increase of import penetration was higher in the US (higher β), or that the share of variance in import penetration that can be explained by the instrumental variable is

[22] In some instances these numbers were directly reported in the paper. In some other instances we have computed them combining various pieces of information within papers.

[23] We recall that, in Germany, job losses in import competing industries have been more than compensated by job creation in export-oriented industries during the same period (Dauth et al., 2014).

greater for the US. In order to assess the relative contribution of these factors, we replicate the analysis in Autor et al. (2013), making use of data from the replication packages of Autor et al. (2013) and Acemoglu et al. (2016). Specifically, for comparability purposes, we substitute the original import per worker measure employed in Autor et al. (2013) with an import penetration one, built thanks to data from Acemoglu et al. (2016). We leave other parts of their specification unchanged.[24]

Our results are reported in Table 7. In column (1) we report the estimated β coefficients for Italy and the US. In the US, a one percentage point increase of import penetration over a decade is associated with a 0.674 decline in the share of working-age population working in manufacturing. This estimated marginal effect is 4.62 times larger than in the Italian case. In column (2) and (3) we examine the average increase in import penetration in US and Italy during the first decade (1990s) and the second decade (2000s), respectively. Averages are weighted by local labor market working-age population. While in the 1990s Italy and the US saw virtually the same p.p. increase in import penetration from China, in the 2000s we see a much greater increase in Italy. Average import penetration was $1/0.31 = 3.22$ times higher in Italy in the 2000s. This could be explained by the fact that Italy displays a higher degree of overall trade openness compared to the US. In column (4) we compare the share of variance in the national measure of import penetration that can be explained by the instrumental variable. As explained in Autor et al. (2013), multiplying the implied effect by this share should isolate the component of Chinese import competition that stems from productivity improvements in China. This factor is also higher in the US, by a factor of 1.3. Overall, we can say that while Italian local labor markets were more exposed to Chinese import competition, the marginal effect of such competition was stronger in the US, yielding overall stronger effects. There are several possible explanations for this difference. In what follows we will focus on two of them: labor market institutions and industry composition.

The first set of explanations for the smaller marginal effects in Italy could be due to some specific institutional feature of the labor market. On the one hand, Italy is considered one of the strictest countries in term of Employment Protection Legislation (EPL, henceforth) (OECD, 2020). Strict EPL in the form of high dismissal costs, for example, could prevent firms to fire incumbent workers and affect the overall level of *gross* worker flows, churning

[24]For the construction of the import penetration measure, Acemoglu et al. (2016) use two time windows, 1991-1999 and 1999-2007 that are slightly different from Autor et al. (2013) and ours. We therefore appropriately rescale these 8-year long differences so that they reflect decade-equivalent changes (multiplying by 8/10). Industry employment shares are always fixed at 1988.

and reallocation.[25] On the other hand, Italian firms also had the possibility to resort to short-time work schemes (STW, henceforth), which provide subsidies to labor hoarding during times of crisis and also discourage separations.

We perform two exercises that try to investigate to what extent EPL or STW could have contributed to attenuate the effects of Chinese competition. Our methodologies and results for both exercises are reported in Appendix B. In the first exercise, we test whether employment changed by less in firms subject to stricter EPL, for the same level of import exposure.[26] We find no evidence that this is the case. For the same level of import exposure, cohorts of firms subject to stricter EPL did not follow differential employment trends throughout the 1990s and the 2000s. This null result is driven by small point estimates and not by large standard errors. In the second exercise, using more aggregate INPS and National Accounts data on the evolution of STW for the period 1995-2007, we test whether import-competing sectors made greater use of STW schemes. While our point estimates suggest that more exposed sectors indeed used more STW hours after 2001, the effect represents just a small fraction of the overall decline in hours worked, and therefore could only have partially attenuated the effects of the China shock. All in all, these results suggest that institutional features of the labor market may have played a role. However our evidence indicates that one should be cautious in overestimating their importance.

The second explanation that we explore to rationalize the small marginal effect of Chinese import competition in Italy is the role of industry composition. Italy and the US were specialized in very different industries already in the mid 1990s. The US had higher employment shares in high-tech sectors linked to computing and ICT, while Italy was specialized in lower-tech sectors linked to textile and clothing (T&C), together with leather goods. The common view is that China exports low-tech goods that are intensive in the use of labor. Given these specialization patterns this would have implied bigger employment losses in Italy, compared to the US. However, starting from the early 2000s, the structure of Chinese exports changed in favour of consumer electronics and other relatively high-tech goods, in a way that was not expected for a country with that level of development (Rodrik, 2006; Schott, 2008).[27]

[25] EPL could also have an effect on the overall level of employment, although the empirical literature has found mixed evidence for this. On this last point see ILO (2012) for a summary or (Kugler and Pica, 2008) for the Italian case.

[26] In particular we exploit a discontinuity in the strictness of EPL occurring at 15 employees: establishments above this threshold have higher firing costs. See Appendix B for all the details.

[27] One emblematic case in this respect is Lenovo's acquisition of the IBM PC division in december 2004.

Using techniques developed by Goldsmith-Pinkham et al. (2018), we analyze whether the local labor market effects in the two countries are indeed driven by different industries.[28] Results reported in Appendix C show that indeed the set of industries driving the effect differ substantially between the two countries: in the US the effects are driven by Electronic computers and semiconductors, while the textile and clothing (T&C) sector are driving the effect in Italy.[29] These results suggest that another possible explanation for the difference between the aggregate effects on the two sides of the Atlantic is the fact that in the two countries results are driven by different industries.

5 Worker level evidence

Our focus in this section is to examine the career trajectories of incumbent workers who were employed in manufacturing in 1991, and were subsequently hit by import shocks of different magnitudes depending on the precise industry they were working in. While the focus on this subpopulation of individuals does not offer a complete picture of what happened to the careers of *all* manufacturing workers from 1991 till 2007, it allows us to better control for the endogenous selection of workers across different industries, while offering a medium to long-run overview of the effects of the "China shock" at the worker level.

In all that follows, we consider a 16-year period (1991-2007) and look at cumulative outcomes related to the time spent employed and earnings. In this section, our research design follows Autor et al. (2014). Similarly to them, after assessing the overall impact of Chinese trade on careers, we decompose outcomes according to where they are accrued: initial employer, other employers, initial 2-digit manufacturing sector, other 2-digit manufacturing sectors, the non-tradable sector, initial local labor market or other local labor markets. We compare individuals who are observationally similar in 1991, except for

[28] The authors show that the 2SLS estimator based on a Bartik instrument (like ours) can be expressed as a weighted average of industry-specific marginal effects, where the weights depend on the relative strength of industry-specific first stages. These weights are referred to as Rotemberg weights (Rotemberg, 1983). Although the weights always sum to one, negative weights are possible. This happens when the first stage coefficient associated to one industry and the overall one are opposite in sign. In our sample, as in Autor et al. (2013), negative weights are quantitatively unimportant.

[29] It is worth noticing that China's T&C exports were subject to trade quotas under the Multi Fiber Arrangement. Because these quotas were progressively removed in 2002, 2005 and 2008, it could be the case that part of the negative effect of Chinese competition in Italy would only materialize after 2007. While we cannot exclude this possibility, the important changes that happened in the world economy since 2008 (i.e. the trade collapse and the global financial crisis) prevent us from extending our period of analysis.

their narrow industry affiliation. In doing so, we control not only for observable individual characteristics, but also characteristics of the firm and sector where these workers were employed at the time. For identification we use variation within broad manufacturing sub-sectors and within local labor markets.

We attribute 1991-2007 changes in import penetration to each worker based on the 4-digit industry of their employer in 1991. When a worker has more than one job in 1991, we consider the spell where the worker earns the highest share of income for that year. As highlighted in Section 3, we instrument changes in Chinese import penetration in Italy with changes in Chinese import penetration for a selected set of high income countries. We attribute the value of the instrument to each worker based on their industry affiliation in 1988, three years prior to 1991. We do this to account for the fact that some workers could have changed industries in anticipation of future trade with China (Autor et al., 2014). All of the worker-level results are robust to alternative measures of trade-exposure (see Appendix D).

Our empirical specification is very similar in spirit to Autor et al. (2014). Our preferred specification takes the form:

$$Y_{ij} = \alpha + \beta_1 \Delta IP_{jt} + \beta_2 IP_{j,91} + X'_{ij}\gamma + X'_j\delta + \theta_k + \eta_s + \epsilon_{ij}, \tag{8}$$

where Y_{ij} is the outcome of interest for worker i employed in 1991 in industry$j$, ΔIP_{jt} is the 1991-2007 change in import penetration, $IP_{j,91}$ is the level of import penetration for that same industry in 1991. X'_{ij} is a vector of individual characteristics, all measured at the beginning of the period. This includes a dummy for being female, year of birth dummies, a dummy for being foreign-born, dummies for the age of entry into the labour market, the log of average annual earnings and log change in earnings between 1988 and 1991, a dummy for being a part-time worker, and six dummies related to coarse occupational codes.[30] We also include firm level controls, measured at the main job the worker holds in 1991: the dimensional class of the firm and the log of the average wage in the firm. X'_j is a vector of 4-digit industry characteristics. We include the share of white collars workers in 1991, the change in the industry employment share between 1983 and 1991, and the log change in the industry average wage between 1983 and 1991. We also use dummies for 14, broadly defined, manufacturing sub-sectors (θ_k) and local labor market fixed effects (η_s). We cluster standard errors at the level of 1991 4-digit industry, to account for the fact that the long-run outcomes are correlated for individuals initially

[30]These are apprentice, blue collar, high-skilled blue collar, white collar, middle manager, manager.

employed at the same firm, or in the same industry.

5.1 Import competition and individual careers

In Table 8 we present 2SLS estimates of equation 8 for different labor market outcomes at the individual level. Regardless of the measure used, we fail to detect any economically significant impact of Chinese import competition on individual careers. This stands in contrast with previous work, which has systematically detected losses for the average exposed worker (Autor et al., 2014; Utar, 2018; Dauth et al., 2018) Column (1) reports the estimated effect of changes in Chinese import penetration on the cumulative number of months with at least one day of employment. The coefficient is not significantly different from zero, and 95% confidence intervals exclude any economically meaningful effects. The point estimate of 0.013 indicates that a 10 percentage-points increase in import penetration is associated with a 4-days ($0.013 \times 10 \times 365/12 = 3.95$) increase in the time spent in employment over a 16-year period.[31] While this indicates a null effect of Chinese trade along the *extensive* margin of employment, it is not conclusive about the *intensive* margin. After a trade shock, workers could remain employed but see their number of working weeks or hours reduced. In columns (2) and (3) we investigate this channel by looking at the cumulative number of weeks and the number of full-time-equivalent (FTE) weeks worked. Any difference in the effects on these two variables should reflect a change in working hours. We find no negative effect along these margins. If anything, we see a slight increase in the number of weeks worked, although the impact is very small in size. A 10 percentage-point increase in import penetration is at most associated with a 5 days ($0.088 \times 10 \times 6 = 5.3$) increase in time spent in employment, over a period of 16 years.[32]

In the next two columns, we look at earnings-related measures. In column (4) we study cumulative earnings normalized by average 1988-1991 yearly earnings, while in column (5) we look at cumulative earnings per 12 months worked, always normalized by average initial earnings (a proxy for wages).[33] More exposed workers did not face any appreciable income loss compared to observationally similar, but less exposed, individuals.[34] As a

[31] A 10 p.p. increase in import penetration is approximately the difference faced two workers employed in industries at the 25th percentile and the 75th percentile of import exposure, respectively (that is 10.7 p.p.)

[32] Results are robust to the set of control variables included (see Table A.3 in the Appendix).

[33] Compared to a specification with log earnings on the l.h.s. and individual fixed effects, such normalization only uses of information on workers' careers that is unaffected by the subsequent rise of Chinese trade (Autor et al., 2014).

[34] The use of STW cannot explain the null effects. Indeed, the INPS measures of cumulative earnings

consequence they did not face lower wages conditional on working.[35]

In our empirical strategy we focus on long-run outcomes. However, it could be the case that the cohorts of workers we analyze suffer the consequences of import competition in the 1990s, but then recover during the 2000s, or vice-versa. Ignoring these dynamic effects could mask an important part of the story. In Figure 4 we show the dynamic effect of exposure to Chinese competition on cumulative outcomes, computed as a rolling sum from 1992 up to the year indicated on the horizontal axis.[36] The estimating equation is the same as equation 8. Because the trade exposure measure is the same as in our baseline regression, i.e. the 1991-2007 real change in Chinese import penetration, the figure shows how the impact of the shock accumulates over time. The plot reveals no significant dynamic pattern, nor on months worked nor on cumulative earnings. For both variables point estimates are positive, but rarely statistically significant. Same as for our baseline estimates, the 95% confidence intervals in the graph exclude economically relevant magnitudes. These results stand in contrast to what has been documented for the US in Autor et al. (2014), where the negative effect of Chinese competition on workers' careers progressively grows over the 1990s and intensifies after 2001.

The fact that the overall impact is not distinguishable from zero does not imply that more exposed workers did not experience any change in their career. It could be that workers experienced a negative shock at their initial employer but were able to adjust by finding job opportunities at new firms, potentially in other sectors and other localities. In Table 9 we unpack the total effects analyzed in Table 8 into a component observed at the initial employer and a (complementary) component observed at other employers. For ease of exposition we only report effects on the number of months worked, cumulative earnings and earnings per effective year worked. In panel (a) we find that more exposed workers spend less time at their initial employer (column (2)) but that such loss is entirely compensated by transitions towards other firms (column (3)). This is reflected in cumulative earnings changes at the initial employer vs other employers (panel (b)). Conditional on moving towards other firms, workers obtain slightly higher earnings, compared to observationally similar workers who also move. The coefficient in panel (c), column (3) indicates that a 10 p.p. increase in import penetration leads to an earning growth 0.3% of average 1988-1991

only include what the employer owes to the worker, thus excluding all top-ups from the Social Security Agency or the government. As a consequence, if more exposed workers were *more* likely to be on STW, we would observe a drop in earnings.

[35]The coefficient in column (4) implies that a 10 p.p. increase in import penetration causes a cumulative earnings difference of 3% of average yearly earnings in 1988-1991. Given that the average (gross) salary is around 23,300 euros, the coefficient implies a gain of 700 euros over 16 years.

[36]This is identical to Figure 3 in Autor et al. (2014)

yearly earnings every 12 months worked.

5.2 Where do workers find new job opportunities?

We have established that, on average, more exposed workers did not lose in terms of time spent in employment or earnings, because of trade. Losses at the initial employer are compensated by transitions towards other firms. In this subsection we investigate where these gains are accrued. We look separately at sectoral mobility and geographical mobility. Similarly to Section 5.1, in Table 10 we decompose outcomes observed at new employers into a component that is accrued within the initial sector and other ones accrued outside. Our estimates indicate that new job opportunities are to be found in the non-tradable sector. More exposed workers spend less time working in their initial 2-digit sector and equally in other 2-digit sectors within manufacturing. Results in panel (c) indicate modest earning growth (compared to the counterfactual) due to transitions towards the non-tradable sector.

The importance of the non-tradable sector sector in smoothing out trade shocks in manufacturing is not new in the literature. However previous studies document either that these transitions do not allow workers to fully counteract their initial shock, or that only a subset of them is able change sector in a successful way (Autor et al., 2014; Utar, 2018; Dauth et al., 2018; Dix-Carneiro and Kovak, 2019).[37] We offer two sets of possible explanations for why transitions to the non-tradable sector have been particularly successful for Italian manufacturing workers. The first is that employment growth in non-tradables was strong, when compared to other developed economies. For example, between 1991 and 2007, its employment share went from 57% to 66% (+15.7%) in Italy and from 72% to 77% (+6.9%)in the US.[38] (ILO, 2019). Therefore, the sector as a whole could provide a high number of vacancies for workers leaving manufacturing jobs. The second is that the skill content of the average job in non-tradables in Italy was sufficiently low so that manufacturing workers could easily switch. As a consequence manufacturing workers could more easily re-employ themselves in such sector. In Table 11 we separate non-tradable industries into "knowledge-intensive" (KIA) and "non-knowledge-intensive", according to

[37]For example, Utar (2018) shows that among workers with the same level of (vocational) education, those who were initially trained for service-related jobs do well in comparison to workers with manufacturing-specific vocational training, as they transition from manufacturing to the jobs in the service sector.

[38]This difference is exacerbated by the fact that, at the same time, the number of manufacturing jobs was declining in the US and staying constant in Italy.

the Eurostat definition, and check which ones can account for most of the transitions.[39] As expected, non-KIA industries account for 100% of job transitions outside of manufacturing that occur because of Chinese trade.

In Table 12 we investigate differential patterns of geographical mobility. Our results indicate that exposed workers were more likely to spend more time outside of their initial LLM (panel (a), column (3)), earning more as a consequence (panel (c), column (3)). For exposed workers, the number of extra months worked in a different LLM (panel (a), column (3)) is lower in magnitude than the number of extra months worked in the non-tradable sector found in Table 10. This suggests that part of the new employment opportunities in the non-tradable sector are found close to home, but a substantial component requires commuting to other local labor markets. In Table 13 we further decompose geographical mobility responses according to whether they occur within the same region or outside the initial region. We find that workers find new job opportunities outside their region. These result stand in contrast with all previous worker-level studies on the impact of Chinese trade, where no geographical mobility responses have been found (see e.g. Autor et al. (2014); Dix-Carneiro and Kovak (2019)). This is also at odds with another strand of literature that has highlighted the relatively weak relationship between labour demand shocks and population in Italy (Ciani et al., 2019, among others). The higher degree of geographical mobility in Italy in response to the "China shock" thus constitutes a puzzle that we aim to investigate in future research.

6 Conclusions

In this paper we studied the effect of the recent rise of China as major worldwide manufacturing producer on local labor markets and individual workers' careers in Italy. While a robust finding from recent works (Autor et al., 2013; Donoso et al., 2015) is that trade with China can account for a substantial fraction of the decline of manufacturing employment, we find that the impact on the Italian labor market has been modest. The lack of an overall change in employment levels does not imply, however, that the manufacturing sector did not experience some important transformations during this period. Opposite to a marked decrease in the share of manufacturing workers employed in more traditional sectors like textile and apparel, in fact, there was a corresponding increase in other sectors like metal manufacturing and machinery (Brandolini and Bugamelli, 2009).

[39] A 2-digit sector is classified as "knowledge-intensive" if more than 1/3 of its employees have completed tertiary education.

The "China shock" could also have deteriorated the careers of incumbent manufacturing workers, whose industry-specific skills may not have allowed successful transitions towards other parts of the economy (Autor et al., 2016). Instead, our results suggest that the presence of new job opportunities in low-skill-intensive industries in the non-tradable sector helped workers to absorb the initial shock. We also document that those transitions were associated with an increase in geographical mobility towards areas with better job opportunities.

While the presence of job opportunities in low-skill-intensive industries outside of manufacturing can be peculiar to the Italian case, where non-tradables were gaining employment shares, our results indicate that the ability of an economy to absorb an external shock crucially depends on the country specific features. From this perspective, it should be not surprising that the effects of the "China shock" vary tremendously across countries, as documented by existing studies.

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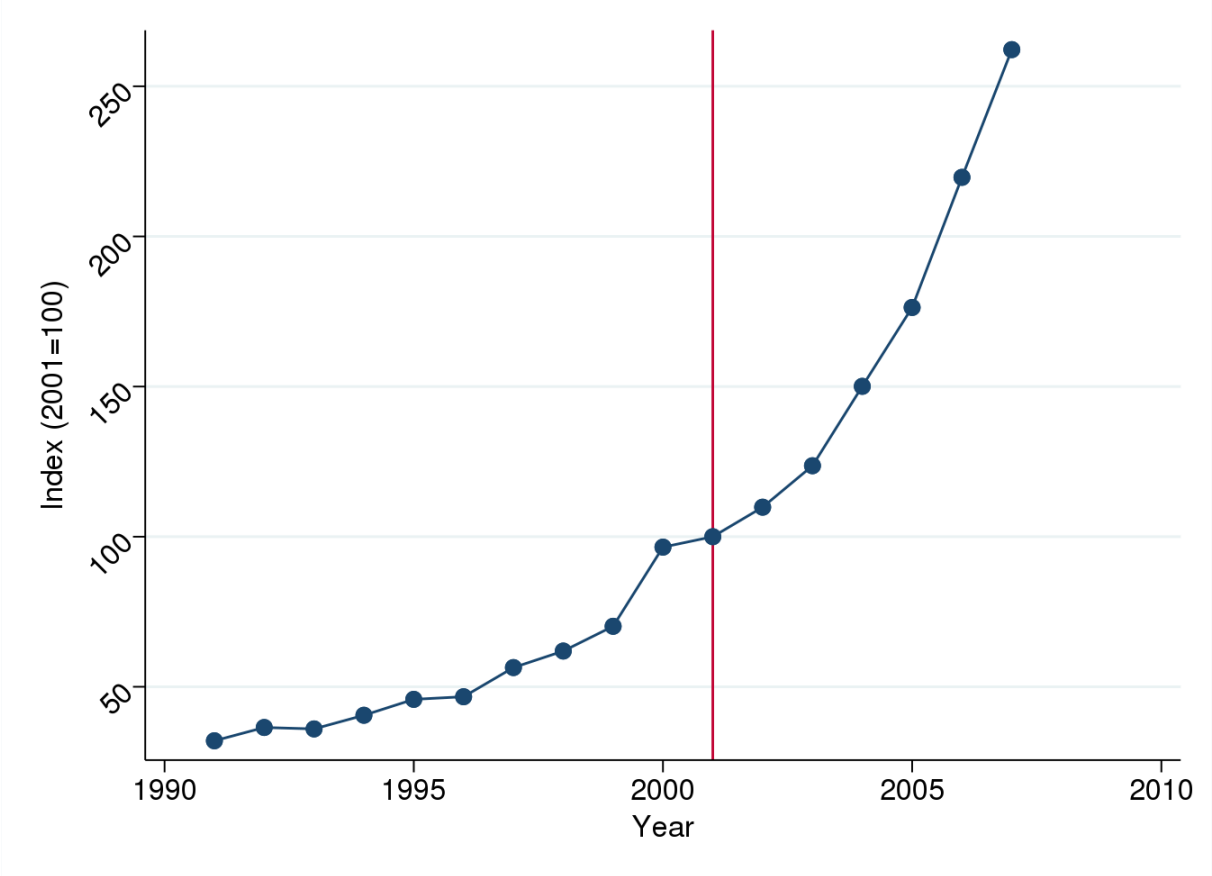
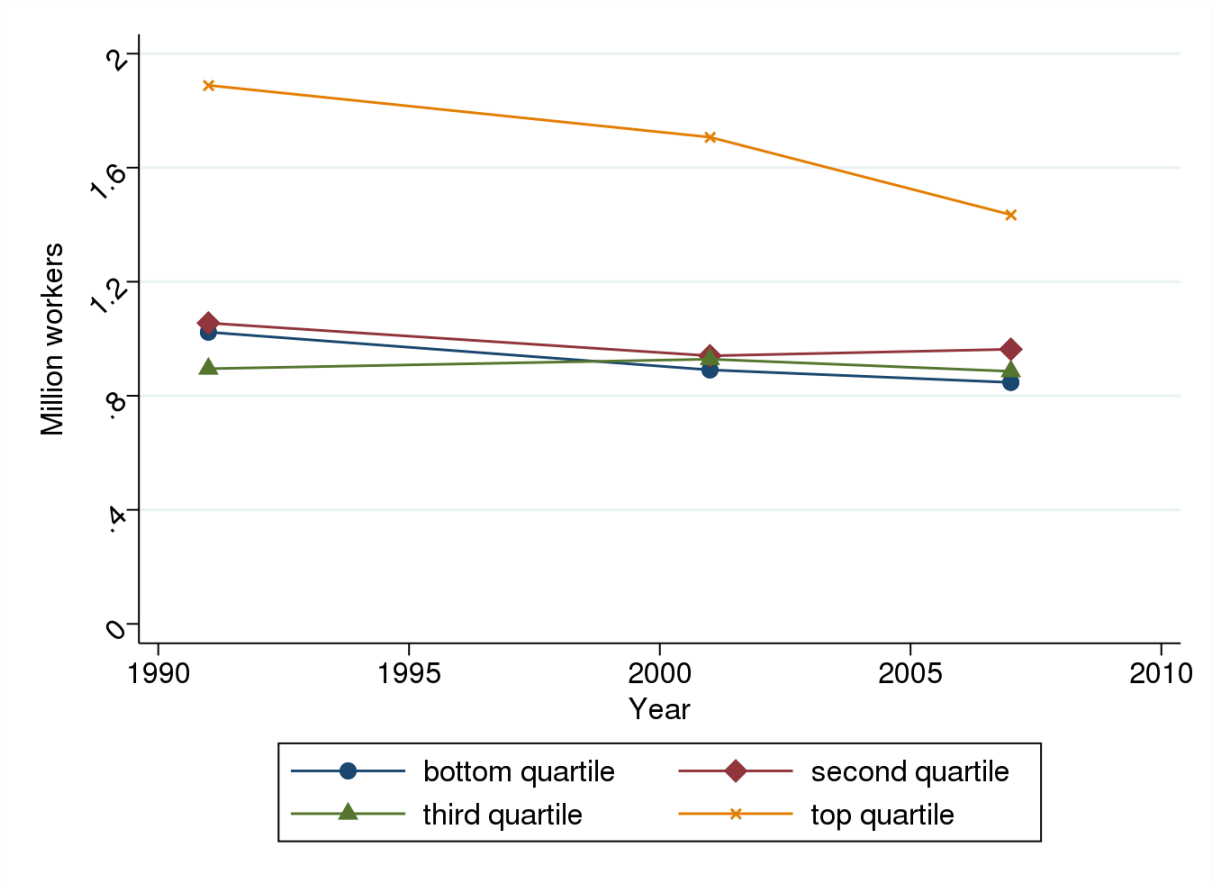
Figures

Figure 1: Italian Real Imports from China (2001=100)



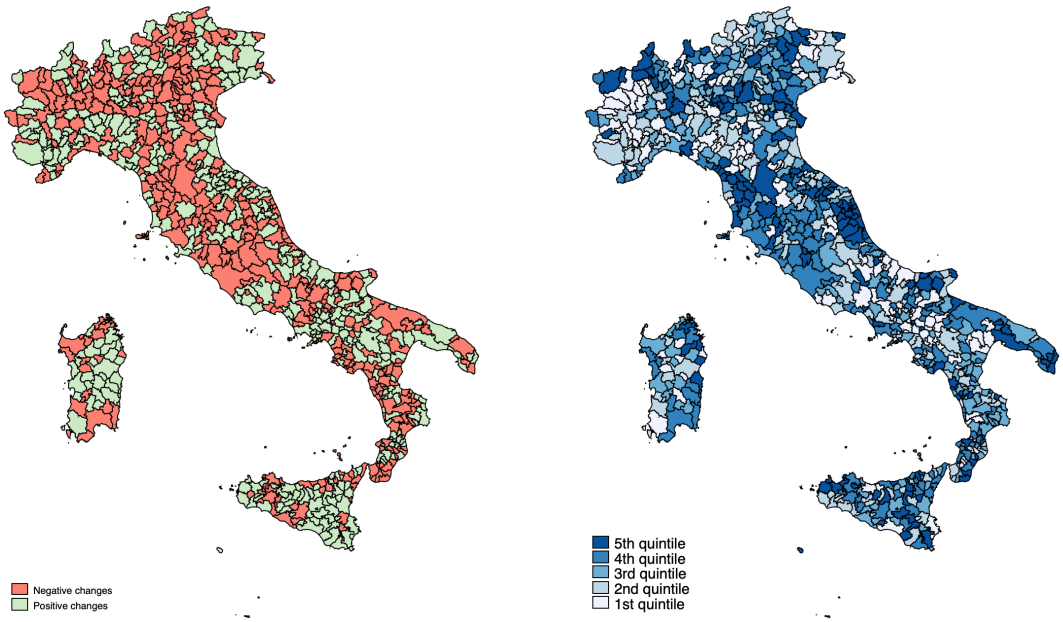
Notes: The Figure displays real changes in total Italian imports from China, normalized to 100 in 2001. The vertical line indicates China's accession to the WTO in 2001. Authors' elaborations on Eurostat data.

Figure 2: Manufacturing employment by quartile of import penetration



Notes: The figure displays the evolution of manufacturing employment for industries divided by quartiles of exposure to Chinese import competition over the period 1991-2007. For each industry the latter is measured as the predicted value of a simple bivariate regression of 1991-2007 real changes in Chinese import penetration in Italy against 1991-2007 real changes in Chinese import penetration in other non-EU developed countries. For each group of industries we have plotted the level of employment (in millions) in the three years used in the analysis: 1991, 2001 and 2007. Data for the year 1991 and 2001 are from the manufacturing census, while data for 2007 are from the Italian Statistical Register of Active Enterprises (ASIA).

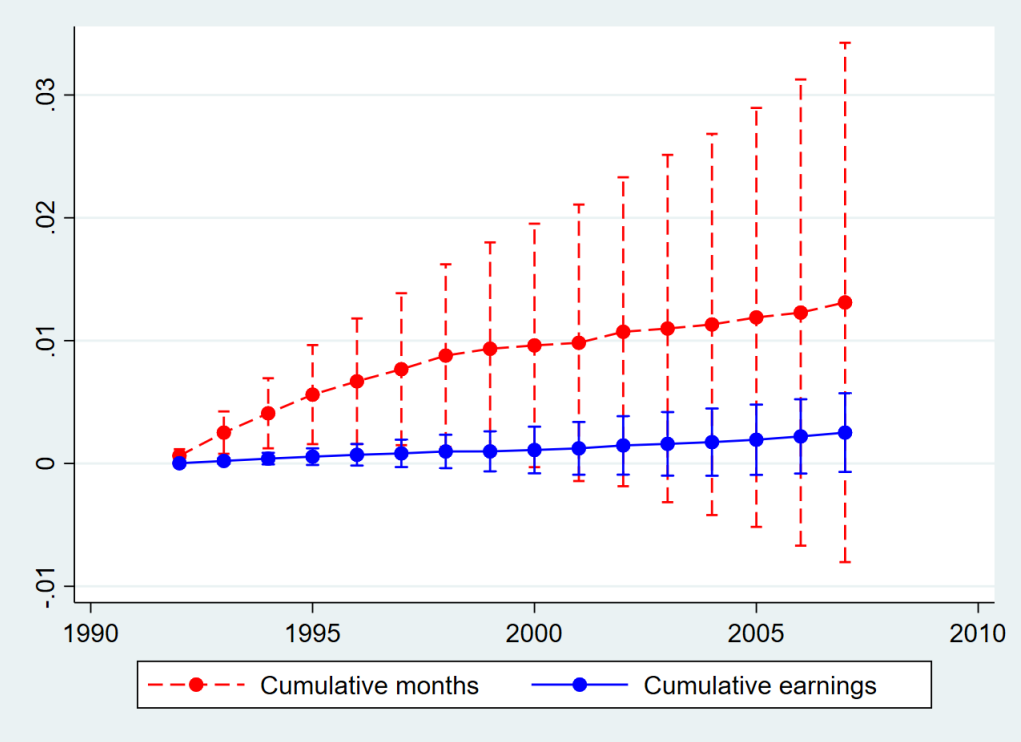
Figure 3: Changes in manufacturing employment and import penetration across local labor markets



(a) Δ manufacturing share of w.a.p (b) Δ Import penetration

Notes: The Figure displays 2001-2007 changes for 784 local labor markets. Subfigure (a) displays changes in the share of working-age population that is employed in manufacturing. Subfigure (b) displays changes in the import penetration ratio. Both measures are first residualized against the manufacturing employment share in 2001.

Figure 4: Cumulative months and cumulative earnings since 1991



Notes: The Figure displays regression coefficients and 95% confidence intervals of year by year regressions of cumulative months worked (red line) and cumulative earnings (blue line), from 1992 up to the year indicated on the x axis on the 1991-2007 changes in import penetration from China. The point estimate for year 2007 correspond to the estimates reported in the baseline results (see Table 8).

Tables

Table 1: Chinese import penetration and industry-level employment shares

	Δ *Import*	*Employment Share (p.p.)*	
	$Penetration_{07-91}$	1991	2007
Tanning and dressing of leather	32.44	4.70	3.53
Furniture and manufacturing n.e.c.	25.84	5.97	6.27
Wearing apparel	19.58	8.46	5.03
Medical, optical and other instruments	13.89	2.27	2.92
Machinery and equipment	13.49	10.45	12.67
Radio, television and communication equip.	12.50	2.70	1.72
Basic metals	11.32	3.33	2.99
Electrical machinery	8.51	4.01	4.20
Textiles	8.16	7.43	4.82
Office, accounting and computing machinery	7.22	0.49	0.32
Fabricated metal products	5.86	11.83	15.93
Rubber and plastic	4.36	3.46	4.39
Other non-metallic mineral products	4.28	5.35	5.37
Other transport equipment	3.85	1.89	2.38
Wood and cork (except furniture)	3.79	3.60	3.66
Chemicals	2.38	4.57	4.17
Motor vehicles, trailers and semi-trailers	1.44	4.16	3.64
Paper	1.33	1.71	1.72
Publishing and printing	0.72	3.78	3.52
Coke, refined petroleum and nuclear fuel	0.61	0.56	0.50
Food and beverages	0.43	8.93	10.22
Tobacco	0.00	0.34	0.03
Overall economy	6.30		
Total employment (millions)		5,184	4,551

Notes: The second column reports the changes in import penetration from China, between 1991 and 2007, for each 2-digit ISIC3 industry. The change in import penetration is defined as $\Delta IP_{jt}^{ITA} = \Delta M_{jt}^{ITA}/(Y_{j,91} + M_{j,91} - X_{j,91})$. Correspondingly, the last two columns report industry employment shares in total manufacturing employment in 1991 and 2007.

Table 2: Summary statistics

Variable	Mean	Std.Dev.
Panel (a): LLM evidence		
Long-differenced outcomes (1991-2007)		
Δ manufacturing emp/work age pop (p.p.)	-1.43	(2.71)
Δ non-tradables emp/work age pop (p.p.)	9.20	(5.17)
Δ total emp/work age pop (p.p.)	7.77	(5.08)
Import penetration changes (1991-2007)		
Δ Import penetration (1991-2001) (p.p.)	0.68	(0.52)
Δ Import penetration (2001-2007) (p.p.)	3.52	(2.47)
Control variables (1991)		
Female employment rate (p.p.)	27.50	(7.94)
Manufacturing share of empl. in 1991 (p.p.)	33.81	(11.51)
Panel (b): Worker-level evidence		
Cumulative outcomes (1992-2007)		
Months worked	157.26	51.74
Weeks worked	686.75	230.09
FTE weeks worked	674.99	234.59
Cumulative earnings (multiples of 1988-1991 average annual earn.)	15.29	6.52
Cumulative earnings per 12 months worked (multiples of 1988-1991 average annual earn.)	1.14	0.28
Years of positive earnings	13.80	4.10
Control variables (1983-1991)		
Female (share)	0.32	0.47
Apprentice (share)	0.001	0.030
Blue collar (share)	0.72	0.45
White collar (share)	0.27	0.45
Foreign-born (share)	0.021	0.14
$\Delta \log(\text{earnings})_{1988-1991}$	0.09	0.21
Average log(earnings) in 1988-1991	10.06	0.30
Log average firm earnings in 1991	7.06	0.30
Share of white collars in industry in 1991	0.25	0.14
Δlog(Earnings) 1983-1991 of industry	0.70	0.07

Notes: The table provides summary statistics for variables employed in both the local labour market and worker-level analyses. In panel (a) averages are calculated starting from local labor markets and weighted by start-of-period working-age population. In panel (b) we provide summary measures for the set of all workers who had a year-round job in manufacturing in 1991 and also had a year-round job in all years between 1988 and 1990. Months worked are defined as calendar months with at least one day of positive earnings. Cumulative earnings measures are both expressed in multiples of average 1988-1991 earnings.

Table 3: Imports from China and changes in manufacturing employment (2SLS estimates)

	Δ manuf emp/work age pop (p.p.)					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel (a) : 1991-2007 stacked differences						
ΔImport penetration^{ITA} (p.p.)	-0.253***	-0.203***	-0.146***	-0.132***	-0.094**	-0.098**
	(0.0436)	(0.0478)	(0.0425)	(0.0471)	(0.0380)	(0.0444)
Panel (b) : First stage estimates						
ΔImport penetration^{OC} (p.p.)	0.0621***	0.0587***	0.0555***	0.0585***	0.0524***	0.0557***
	(0.00299)	(0.00333)	(0.00359)	(0.00150)	(0.00341)	(0.00130)
Observations	1568	1568	1568	1568	1568	1568
K-P F-stat.	435.4	311.9	241.5	1538.3	236.0	1837.9
Region FE	NO	YES	YES	YES	NO	NO
Decade FE	YES	YES	YES	YES	NO	NO
Region × decade FE	NO	NO	NO	NO	YES	YES
LLM controls	NO	NO	YES	YES	YES	YES
Weights	YES	YES	YES	NO	YES	NO

Notes: The table presents 2SLS regressions of the change in manufacturing employment over working age (15-64) population against changes in the import penetration ratio, at the local labor market level ($N = 784$). Region FE include 20 dummies. LLM controls include the female employment rate and the manufacturing share in total employment in 1991. The latter corresponds to the number of people employed in manufacturing industries over total private non-farm employment. Regressions in columns 1 to 3, and column 5 are weighted using beginning of period LLM working-age population. Standard errors are clustered at the local labor market level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Future import from China and changes in manufacturing employment between 1981 and 1991 (2SLS estimates)

	$\Delta_{'91-'81}$ manuf emp/work age pop (p.p.)			
	(1)	(2)	(3)	(4)
ΔImport penetration$^{ITA}_{1991-2001}$ (p.p.)	0.169	-0.324		
	(0.436)	(1.232)		
ΔImport penetration$^{ITA}_{2001-2007}$ (p.p.)			0.0522	-0.00627
			(0.0665)	(0.211)
Observations	784	784	784	784
K-P F-stat.	620.5	899.3	143.5	617.7
Region FE	YES	YES	YES	YES
LLM controls	YES	YES	YES	YES
Weights	YES	NO	YES	NO

Notes: The table presents 2SLS regressions of the change in manufacturing employment over working age (15-64) population between 1981 and 1991 against changes in future import penetration, at the local labor market level ($N = 784$). In the first two columns the change in future import penetration is computed between 1991 and 2001, in the last two columns the change in import penetration is computed between 2001 and 2007. Region FE include 20 regions dummies. LLM controls include the female employment rate and the manufacturing share in total employment, i.e. the number of people employed in manufacturing industries over total private non-farm employment, measured at the start of the previous decade, i.e. in 1971. Regressions in columns 1 and 3 are weighted using beginning of period LLM working-age population. Standard errors are clustered at the local labor market level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Import from China and other labor market outcomes (2SLS estimates)

	(1) Mfg. Empl.	(2) Non-trad. Empl.	(3) Total Empl.	(4) Δ log w.a.p.
ΔImport penetration^{ITA}	-0.146***	-0.0412	-0.187**	0.00157
	(0.0425)	(0.0595)	(0.0834)	(0.00106)
Observations	1568	1568	1568	1568
K-P F-stat.	239.5	239.5	239.5	1525.2
Region FE	YES	YES	YES	YES
LLM controls	YES	YES	YES	YES
Weights	YES	YES	YES	NO

Notes: The table presents 2SLS regressions for the stacked difference model between 1991 and 2007. In the first column the dependent variable is the change in manufacturing employment over working age (15-64), as in column 3, panel a of table 3. In the second column the dependent variable is the change in the number of people employed in non-tradables over working age (15-64) population. In the third column the dependent variable is the change in the total number of people employed in the private non-farm sector over working age (15-64) population. Finally, in the last column, the dependent variable is the is the (natural) log change in working age (15-64) population. Coefficients in column (1) and column (2) sum up to the coefficient in column (3). Region FE include 20 regions dummies. LLM controls include the female employment rate and the manufacturing share in total employment, i.e. the number of people employed in manufacturing industries over total private non-farm employment, measured at the start of the period. All regressions are weighted using beginning of period LLM working-age population. Standard errors are clustered at the local labor market level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: The impact of Chinese and Eastern European competition in the domestic and foreign market on changes in manufacturing employment (2SLS estimates)

	Δ manuf emp/work age pop (p.p.)		
	(1)	(2)	(3)
Panel (a) : 1991-2007 stacked differences			
ΔImport Penetration$^{ITA}_{it,China}$ (p.p.)	-0.146***		
	(0.0425)		
ΔImport Penetration$^{ITA+C}_{it,China}$ (p.p.)		-0.119***	
		(0.0345)	
ΔImport Penetration$^{ITA+C}_{it,China+Est}$ (p.p.)			-0.107***
			(0.0302)
Panel (b) : First stage estimates (†)			
ΔImport Penetration$^{OC}_{it}$ (p.p.)	0.0555***	0.0588***	0.0657***
	(0.00359)	(0.00347)	(0.00280)
Observations	1568	1568	1568
K-P F stat	241.5	287.5	549.6
Region FE	YES	YES	YES
Decade FE	YES	YES	YES
Region $\times$ decade FE	NO	NO	NO
LLM controls	YES	YES	YES
Weights	YES	YES	YES

Notes: The table presents 2SLS regressions of the change in manufacturing employment over working age (15-64) population against changes in the domestic Chinese import penetration ratio (column (1)), changes in the domestic plus indirect Chinese import penetration ratio (column (2)) and changes in the domestic plus indirect Chinese and Eastern European import penetration ratio (column (3)), at the local labor market level ($N = 784$). The domestic plus indirect import penetration ratios are defined in equations 6 and 7, respectively. Region FE include 20 dummies. LLM controls include the female employment rate and the manufacturing share in total employment in 1991. The latter corresponds to the number of people employed in manufacturing industries over total private non-farm employment. All regressions are weighted using beginning of period LLM working-age population. (†) The instrument in each column is computed according to the corresponding measure of import penetration used in the main regression. Standard errors are clustered at the local labor market level and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: A comparison of the effects of Chinese import competition in Italy and the United States

	$\hat{\beta}$ (p.p.)	$\Delta IP_{it}^{\text{1st dec.}}$ (p.p.)	$\Delta IP_{it}^{\text{2nd dec.}}$ (p.p.)	Share of variance explained by IV (%)
	(1)	(2)	(3)	(4)
United States	-0.674	0.61	1.84	79%
Italy	-0.146	0.68	5.86	61%
Ratio US/ITA	4.62	0.90	0.31	1.30

Notes: The table presents key inputs for the back-of-the-envelope calculation developed in Autor et al. (2013) for Italy and the US. The $\hat{\beta}$ estimate in column (1) is the 2SLS estimate of the impact of changes in Chinese import penetration (p.p.) on the share of working-age (15-64) population working in manufacturing (p.p.). More details on the specifications are provided in section 4.4. The changes in import penetration (p.p.) in column (2) and (3) are decade-equivalent changes measured over the 1990s (1st dec.) and the 2000s (2nd dec.). The averages are computed across local labor markets and weighted by start of period working-age population. The scaling factor in column (4) is the fraction of the variance of import exposure that can be explained by the instrumental variable. More details on such share are provided in Theory Appendix B of Autor et al. (2013).

Table 8: Import competition from China and cumulative labour market outcomes at the individual level over 1991-2007 (2SLS estimates)

	Cumulative Months	Cumulative Weeks	Cumulative FTE weeks	Cumulative Earnings	Cumulative Earnings per year
	(1)	(2)	(3)	(4)	(5)
$\Delta IP^{ITA}_{2007-1991}$	0.013	0.077*	0.088*	0.003	0.009
	(0.011)	(0.045)	(0.045)	(0.002)	(0.009)
Observations	692079	692079	692079	692079	690316
Full controls	YES	YES	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration. All outcomes are totals over the 16-year period between 1991 and 2007. In column (1)-(3) the dependent variable is the number of months/weeks/full-time-equivalent weeks with at least one day of positive earnings, respectively. For each spell, full-time equivalent weeks are constructed by multiplying the number of weeks worked by the part-time percentage of that contract. In column (4) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In column (5) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in column (1). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls from specification 8. Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Import competition from China and labor mobility (2SLS estimates)

	Total	Same firm	Other firm
	(1)	(2)	(3)
Panel (a) : Months with positive earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.013	-0.069**	0.082**
	(0.011)	(0.032)	(0.032)
Panel (b) : Cumulative earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.003	-0.009**	0.011***
	(0.002)	(0.003)	(0.003)
Panel (c) :Earnings per effective year			
$\Delta IP^{ITA}_{2007-1991}$	0.009	-0.007	0.033**
	(0.009)	(0.008)	(0.013)
Full controls	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration in Italy. In panel (a) the dependent variable is the cumulative number of months with positive earnings in the private non-farm sector over the 1991-2007 period. In panel (b) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (c) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls. Observations are 692079 in Panels (a)-(b) and 690316 in Panel (c). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Import competition from China and labor mobility (2SLS estimates)

		Within manuf.		Outside manuf.
	Other firm	Same 2-dig	Other 2-dig	Non-tradables
	(1)	(2)	(3)	(4)
Panel (a) : Months with positive earnings				
$\Delta IP^{ITA}_{2007-1991}$	0.082**	-0.065**	-0.047**	0.195***
	(0.032)	(0.031)	(0.021)	(0.028)
Panel (b) : Cumulative earnings				
$\Delta IP^{ITA}_{2007-1991}$	0.011***	-0.008**	-0.005**	0.024***
	(0.003)	(0.003)	(0.002)	(0.003)
Panel (c) :Earnings per effective year				
$\Delta IP^{ITA}_{2007-1991}$	0.033**	-0.015	0.009	0.091***
	(0.013)	(0.025)	(0.021)	(0.013)
Full controls	YES	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration in Italy. In panel (a) the dependent variable is the cumulative number of months with positive earnings in the private non-farm sector over the 1991-2007 period. In panel (b) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (c) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls. Observations are 692079 in Panels (a)-(b) and 690316 in Panel (c). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Import competition from China and labor mobility (2SLS estimates)

	Non-tradables	Non Knowledge intensive	Knowledge intensive
	(1)	(2)	(3)
Panel (a) : Months with positive earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.195***	0.192***	0.002
	(0.028)	(0.035)	(0.011)
Panel (b) : Cumulative earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.024***	0.024***	0.000
	(0.003)	(0.004)	(0.001)
Panel (c) :Earnings per effective year			
$\Delta IP^{ITA}_{2007-1991}$	0.091***	0.100***	0.050**
	(0.013)	(0.012)	(0.021)
Full controls	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration in Italy. In panel (a) the dependent variable is the cumulative number of months with positive earnings in the private non-farm sector over the 1991-2007 period. In panel (b) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (c) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls. Observations are 692079 in Panels (a)-(b) and 690316 in Panel (c). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Import competition from China and labor mobility (2SLS estimates)

	Other firm	Same LLM	Other LLM
	(1)	(2)	(3)
Panel (a) : Months with positive earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.082**	-0.028**	0.110***
	(0.032)	(0.013)	(0.030)
Panel (b) : Cumulative earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.011***	-0.004**	0.015***
	(0.003)	(0.002)	(0.003)
Panel (c) :Earnings per effective year			
$\Delta IP^{ITA}_{2007-1991}$	0.033**	0.006	0.068***
	(0.013)	(0.016)	(0.016)
Full controls	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration in Italy. In panel (a) the dependent variable is the cumulative number of months with positive earnings in the private non-farm sector over the 1991-2007 period. In panel (b) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (c) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls. Observations are 692079 in Panels (a)-(b) and 690316 in Panel (c). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Import competition from China and labor mobility (2SLS estimates)

	Other LLM	Same region	Other region
	(1)	(2)	(3)
Panel (a) : Months with positive earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.110***	-0.017***	0.127***
	(0.030)	(0.006)	(0.031)
Panel (b) : Cumulative earnings			
$\Delta IP^{ITA}_{2007-1991}$	0.015***	-0.002***	0.017***
	(0.003)	(0.001)	(0.004)
Panel (c) :Earnings per effective year			
$\Delta IP^{ITA}_{2007-1991}$	0.068***	0.028	0.101***
	(0.016)	(0.025)	(0.020)
Full controls	YES	YES	YES
K-P F-stat.	458.054	458.054	458.054

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration in Italy. In panel (a) the dependent variable is the cumulative number of months with positive earnings in the private non-farm sector over the 1991-2007 period. In panel (b) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (c) the dependent variable is $100\times$ the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls. Observations are 692079 in Panels (a)-(b) and 690316 in Panel (c). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A Additional Tables and Figures

Table A.1: International comparison of the effects of Chinese import competition

	Jobs lost		**Manuf. Empl$_{1995}$**	**Perc. drop**
Country	(1) 1990s	(2) 2000s	(3)	(4)
France	16,000	88,000	3,497,000	2.97%
Germany		312,000*	8,040,000	3.88%
Italy	24,000	119,000	4,637,000	3.08%
Norway	750	3,400	395,000	1.05%
Spain	51,000	280,000	2,385,000	13.87%
United States	548,000	980,000	17,231,000	8.87%

Notes: The table reports the number of manufacturing jobs that were lost due to the rise of China (columns 1-2), the number of manufacturing jobs in 1995 (column 3), and the corresponding percentage drop (column 4), by country. Figures in columns 1-2 are obtained via a variance decomposition first presented in Autor et al. (2013) and only uses the supply-side component of trade with China. Results for France come from (Malgouyres, 2017, p.422) and authors' calculations based on descriptive statistics in Table 1 of the same paper. Results for Germany come from (Dauth et al., 2014, p.1656), and results are only available for the whole 1988-2008 period, indicated with (*). Effects also include Eastern-European exposure. Results for Spain come from (Donoso et al., 2015, p. 1756) and authors' calculations based on footnote 14 of the same paper. Results from Norway come from (Balsvik et al., 2015, pp. 142-143). Results from the US come from (Autor et al., 2013, p.2140). Aggregate manufacturing figures in column 3 are obtained from EU-KLEMS (O'Mahony and Timmer, 2009; Jäger, 2016) for European countries and authors' calculations on figures in Balsvik et al. (2015), OECD (2019) and Eurostat (2019) for Norway. Numbers in column (4) are obtained by summing numbers in columns 1-2 and dividing by the corresponding figure in column (3). Time windows are slightly different across studies: Autor et al. (2013) uses 1991-2000 and 2000-2007. Malgouyres (2017) uses 1995-2001 and 2001-2007. Donoso et al. (2015) use 1999-2003 and 2003-2007. Balsvik et al. (2015) uses 1996-2001 and 2002-2007. Dauth et al. (2014) uses 1988-2008.

Table A.2: Import from China and change of manufacturing employment (OLS estimates)

	Δ manuf emp/work age pop (p.p.)					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel (a) : 1991-2007 stacked differences						
ΔImport penetration^{ITA}	-0.264***	-0.240***	-0.208***	-0.140***	-0.130***	-0.084**
	(0.0396)	(0.0433)	(0.0429)	(0.0403)	(0.0384)	(0.0355)
Observations	1568	1568	1568	1568	1568	1568
Region FE	NO	YES	YES	YES	NO	NO
Decade FE	YES	YES	YES	YES	NO	NO
Region × decade FE	NO	NO	NO	NO	YES	YES
LLM controls	NO	NO	YES	YES	YES	YES
Weights	YES	YES	YES	NO	YES	NO

Notes: The table presents OLS regressions of the change in manufacturing employment over working age (15-64) population against changes in the import penetration ratio. Region FE include 20 dummies. LLM controls include the female employment rate and the manufacturing share in total employment in 1991. The latter corresponds to the number of people employed in manufacturing industries over total private non-farm employment. Regressions in columns 1 to 3, and column 5 are weighted using beginning of period LLM working age population. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: The impact of Chinese and Eastern European competition in the domestic and foreign market on individual careers (2SLS estimates)

	(1) OLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS
Panel (a): Months worked							
ΔImport penetration^{ITA}	-0.035	-0.028	-0.024	-0.009	-0.010	-0.002	0.013
	(0.033)	(0.034)	(0.038)	(0.017)	(0.015)	(0.014)	(0.011)
Panel (b): Weeks worked							
ΔImport penetration^{ITA}	-0.140	-0.095	-0.069	-0.009	-0.016	0.011	0.077*
	(0.149)	(0.150)	(0.161)	(0.074)	(0.062)	(0.059)	(0.045)
Panel (c): FTE Weeks worked							
ΔImport penetration^{ITA}	-0.159	-0.088	-0.054	0.016	-0.009	0.021	0.088*
	(0.167)	(0.162)	(0.176)	(0.082)	(0.065)	(0.061)	(0.045)
Panel (d): cumulative earnings							
ΔImport penetration^{ITA}	-0.001	0.003	0.002	0.003	0.001	0.000	0.003
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Panel (e): earnings per effective year							
ΔImport penetration^{ITA}	0.016	0.036**	0.029	0.030**	0.016	0.000	0.009
	(0.012)	(0.016)	(0.018)	(0.014)	(0.014)	(0.012)	(0.009)
Year of birth FE	YES	YES	YES	YES	YES	YES	YES
Sector FE	YES	YES	YES	YES	YES	YES	YES
Industry Char.	NO	NO	YES	YES	YES	YES	YES
Industry PreTrend	NO	NO	NO	YES	YES	YES	YES
Individual Char.	NO	NO	NO	NO	YES	YES	YES
Firm Char.	NO	NO	NO	NO	NO	YES	YES
LLM FE	NO	NO	NO	NO	NO	NO	YES
K-P F-stat.		110.980	341.532	416.147	418.732	424.936	458.054

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: This table presents 2SLS regressions of individual labour market outcomes against changes in Chinese import penetration. All outcomes are totals over the 16-year period between 1991 and 2007. In panels (a)-(e) the dependent variable is the number of months/weeks/full-time-equivalent weeks with at least one day of positive earnings, respectively. For each spell, full-time equivalent weeks are constructed by multiplying the number of weeks worked by the part-time percentage of that contract. In panel (d) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In panel (e) the dependent variable is 100$\times$ the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in panel (a). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls from specification 8. Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Additional specifications on the effects of labor market institutions

Employment protection legislation: During the period under study, employers could dismiss individuals either for economic reasons or in case of misconduct. On the flip side, workers retained the possibility to take employers to court and have a judge decide whether these dismissals were actually 'fair' or 'unfair'. In case of unfair dismissals, employers had an obligation to reinstate the worker and pay her foregone wages. While this regulation was enforced since 1970 (Law n.300) it only applied to establishments with more than 15 employees (see Boeri and Jimeno (2005); Kugler and Pica (2008)).

In what follows, we want to test whether employment changed by *less* in firms subject to stricter EPL, for the *same* level of import exposure. We thus use firm-level data from INPS and study the evolution of employment throughout the 1990s and early 2000s, depending on the level of import exposure *and* the EPL regime, in an IV-triple-diff framework.[40] We consider yearly cohorts of firms and, for each cohort (t), we divide firms (i) according to an 'EPL-treatment' indicator. The latter is equal to one if a firm had more than 15 employees (L_i) in year $t-1$. We calculate firm size as average employment during the year, net of apprentices, which do not enter the policy-relevant size definition.[41] On the other hand, we define the level of import competition as the 1991-2007 real change in import penetration (ΔIP_{jt}^{ITA}). This latter measure varies at the industry (j) level but is time invariant (being taken over a long difference, consistently with the rest of the analysis). We instrument the import penetration measure in the usual way. Our estimating equation is:

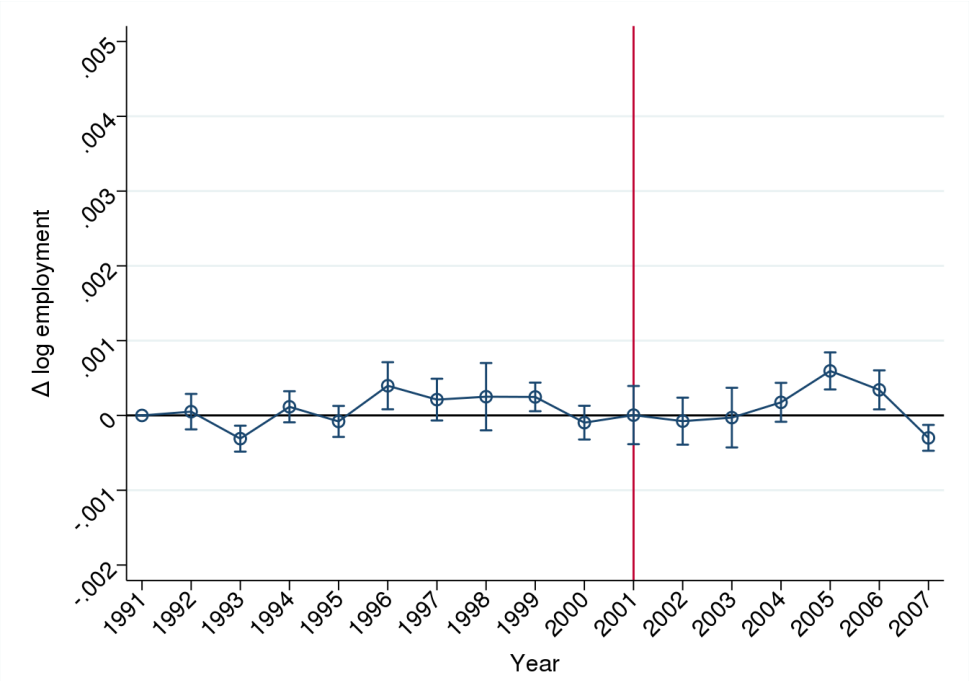
$$\begin{aligned} y_{ijt} = \alpha \; &+ \; \sum_k \beta_k \cdot \mathbf{1}(L_{i,t-1} > 15) \cdot \Delta IP_{jt}^{ITA} \cdot \mathbf{1}(t = k) \\ &+ \; \sum_k \gamma_k \cdot \mathbf{1}(L_{i,t-1} > 15) \cdot \mathbf{1}(t = k) \\ &+ \; \sum_s \sum_k \delta_{kj} \cdot \mathbf{1}(j = s) \cdot \mathbf{1}(t = k) \\ &+ \; \sum_s \zeta_j \cdot \mathbf{1}(j = s) \cdot \mathbf{1}(L_{i,t-1} > 15) \\ &+ \; \epsilon_{ijt}. \end{aligned} \tag{9}$$

[40] Our specification is similar in spirit to Giupponi and Landais (2018).

[41] The cohort design addresses potential mean-reversion bias that would occur if treatment group definition was made based on firm size in some initial year, a point raised in Cahuc et al. (2019).

Note that aside from the triple interaction effects β_k, we also include all the possible double interactions.[42] These are time-varying EPL effects (γ_k), time-varying 4-digit industry effects (δ_k), and EPL×4-digit industry level effects (ζ_k). We run the regression in 9 on years 1991 to 2007 and restrict our analysis to firms between 12 and 19 employees, to increase comparability. We normalize β_{1991} to zero. In Figure B.1 we present graphically the evolution of the β_k coefficients. The latter capture the time evolution of the *difference* in outcomes between cohort of firms in industries that are more or less exposed to Chinese competition, but above the 15-employee threshold, compared to the same difference below the 15-employee threshold.

Figure B.1: Effects of EPL on firm employment in import-competing industries



Notes: The Figure displays 2SLS estimates and associated 95% confidence intervals from specification 9. The latter capture the time evolution of the *difference* in outcomes between cohort of firms in industries that are more or less exposed to Chinese competition, but above the 15-employee threshold, compared to the same difference below the 15-employee threshold. Import competition is measured as the real 1991-2007 change in Chinese import penetration at the 4-digit level.

We find little evidence that these cohorts of firms were on differential trends throughout the 1990s and the 2000s. In spite of the statistical precision, the effects are quantitatively very small and exclude economically relevant magnitudes.

Short-time work schemes: The Italian STW scheme (*Cassa integrazione guadagni* or *CIG*) allows workers to be compensated for hours reduction due to adverse temporary

[42] see Angrist and Pischke (2008) p.242

shocks faced by their employer.[43] The subsidized reduction in hours incentivizes labor hoarding by firms and aims at reducing the number of layoffs following such shocks. Thus it is very well possible that the employment effects that we find in our paper are subdued due to STW. We test this hypothesis by comparing the relative size of hours reductions associated to import competition, and corresponding increases in subsidized hours covered by STW.

Unfortunately for us, INPS detailed STW data at the firm level or at the 4-digit industry level only exists from 2005 onwards. For this reason, we rely on more aggregate data at the sector level, which we are able to link to the National Accounts data starting from 1995. The STW data contains information on how many hours of STW were authorized in each sector-year, while the National Accounts series contain information on *total* hours effectively worked. The latter outcome allow us to reconstruct a *counterfactual* decline in hours, absent STW. After the linkage we have consistent information on eight manufacturing subsectors: wood; food and beverage; metal manufacturing; machinery; textile, apparel and leather goods; manufacturing of minerals; paper.[44]

Given that these sectors are very coarse and the evolution of STW at this level may be contaminated by sectoral trends which happen to be correlated with Chinese trade, we also leverage the time variation in our data and test whether import-competing sectors experienced a trend break in hours and STW around 2001, when Chinese import competition intensified. We do so through an IV-diff-in-diff estimator, which is very similar to our previous EPL analysis. Our main estimating equation is:

$$y_{jt} = \alpha_j + \gamma_t + \sum_{k=1995}^{2007} \rho_k \cdot \Delta IP_{jt}^{ITA} \cdot \mathbf{1}(t = k) + \nu_{it} \tag{10}$$

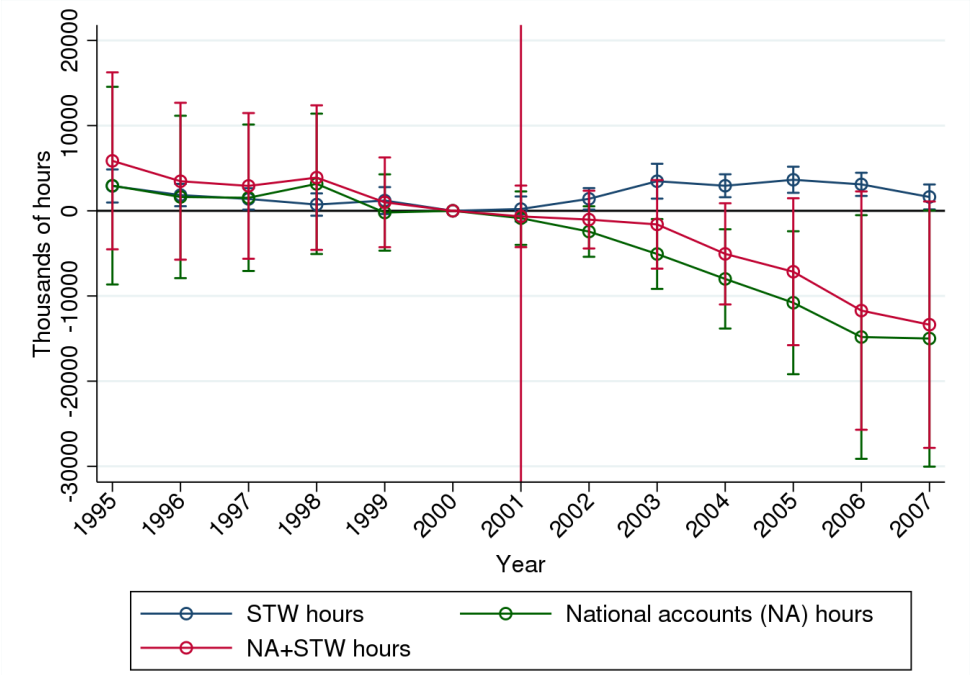
where y_{jt} is the outcome of interest in sector j in year t; α_j are sector fixed effects and γ_t are calendar year fixed effects. ΔIP_{jt} is the 1991-2007 change in Chinese import penetration in Italy in industry j and is instrumented as usual. The coefficient ρ_{2000} is always normalized to zero. We consider three outcomes: the total number of hours effectively worked (from the National Accounts), the total number of authorized STW hours, and the sum of the two, that is total hours *gross* of STW hours.

[43] Different shocks are encompassed in the scheme: revenue or demand shocks, liquidity shocks, need for reorganization etc.

[44] A limitation of these data is that they do not contain information on the *number of workers* under STW program, nor the monetary amounts disbursed. As a consequence, it does not directly map into our other analyses in the paper.

We report the results in Figure B.2. The blue dots represent the evolution of authorized STW hours. The green dots represents the evolution of hours as reported in the National Accounts. The red dots represent a counterfactual series that adds back the STW hours. Our point estimates suggest that more exposed sectors indeed used more STW hours after 2001. However, this represents an increasingly smaller fractions[45] of the total hours decline. While in 2003 STW can account for around 70% of the hours decline, this is equal to just around 10% in 2007. Overall, while qualitatively STW have partially attenuated the effects of the China shock, the quantitative contribution is subdued.

Figure B.2: Effect of Chinese import competition on STW hours



Notes: The Figure displays the effect of Chinese import competition on authorized hours of short-time work (STW hours), total hours effectively worked (NA hours) and total hours gross of STW hours (NA+STW hours), at the sector-year level. Coefficients are estimated with a 2SLS specification as in 10. Chinese import competition is measured as the 1991-2007 real change in import penetration. 95% confidence bands are also displayed. Standard errors are clustered at the sector level.

As a final note, let us clarify that STW cannot explain the null effects in the worker-level evidence. Indeed, the INPS measures of cumulative earnings – and we could write this in the paper – only includes what the employer owes to the worker, thus excluding all top-ups from the Social Security Agency or the government. As a consequence, if more exposed workers were more likely to be on STW, we would observe a drop in earnings. While it is possible that trade-exposed workers were enrolled on STW, they were not more likely than other comparable workers to do so.

[45] This can be obtained by dividing the height of the blue dot by the height of the green dot.

C Bartik shock decomposition

In what follows we use techniques developed by Goldsmith-Pinkham et al. (2018) to analyze whether the local labor market effects in Italy and the United States are indeed driven by different industries. The authors show that the 2SLS estimator based on a Bartik instrument (like ours) can be expressed as a weighted average of industry-specific marginal effects, where the weights depend on the relative strength of industry-specific first stages.[46]

In our setting, these industry-specific weights depend on the (relative) strength with which Italian imports from China in an industry can be explained by the Chinese supply shock, as captured by Chinese exports to other countries.[47]

Results are reported in Table C.1. In Panel (a) we report the top five industries in terms of industry-specific weights (α_k) for the US, together with the associated marginal effects (β_k). Electronic computers and semiconductors strongly contribute to the overall decline. The importance of such industries is also consistent with recent evidence from Bloom et al. (2019), who find that most of China-related employment changes in the US are driven by large multinationals in high-tech sectors switching from manufacturing activities (probably offshored) to service activities. We also find negative effects in furniture and toys, consistent with fast and marked increases in import penetration.[48] Perhaps surprisingly, communication equipment (radio and TV) did not witness employment changes, despite strong import competition. When turning to Panel (b), we find a very different set of industries driving effects in Italy. We find that import changes in the textile and clothing (T&C) sector are associated with employment declines and none of the high-tech sectors rank among the top five. The industry that carries the highest weight is the cutting and shaping of stone. While in this industry Chinese imports rose substantially, this did not cause a fall in employment. This is likely due to strong foreign demand of certain Italian stone varieties (e.g. marble sold to China) that prevented labor demand from falling.[49]

[46] These weights are referred to as Rotemberg weights (Rotemberg, 1983). Although the weights always sum to one, negative weights are possible. This happens when the first stage coefficient associated to one industry and the overall one are opposite in sign. In our sample, as in Autor et al. (2013), negative weights are quantitatively unimportant.

[47] For the US we still use data from the replication packages described above, in exactly the same way.

[48] Reporters from the *Wall Street Journal* have also been arguing that the rise in import competition from China can account for consistent employment declines in the furniture industry (Davis and Hilsenrath, 2016)

[49] The inclusion of the stone-cutting industry is not the only factor responsible for the difference in effects. When repeating the analysis removing such industry, we find a $\hat{\beta}_{2SLS} = -0.315$. The ensuing back-of-envelope calculation of Section 4.1 yields an overall loss of 255,000 manufacturing jobs, amounting

These results show that the effects in the two countries are driven by different industries. Understanding the differences between the aggregate effects on the two sides of the Atlantic is an interesting avenue of research that we plan to pursue in other work.

Table C.1: Rotemberg weights and industry-specific components

Variable	α_k	β_k	95% CI
Panel (a): United States			
Top 5 Rotemberg weights industries (SIC87DD - 392 industries)			
Electronic Computers	0.133	-0.358	[-0.74, 0.15]
Furniture and Fixtures, NEC	0.118	-0.732	[-1.06, -0.48]
Radio and TV Broadc. and Communic. Equipment	0.063	0.037	[-0.50, 0.83]
Semiconductors and Related Devices	0.052	-0.897	[-1.50, -0.49]
Games, Toys, and Children?s Vehicles	0.048	-0.205	[-0.49, 0.08]
Overall $\beta = -0.674$ (0.073)			
Panel (b): Italy			
Top 5 Rotemberg weights industries (ISIC Rev. 3 - 125 industries)			
Cutting, shaping and finishing of stone	0.557	0.023	[-0.06, 0.11]
Footwear	0.232	-0.276	[-0.43, -0.13]
Wearing apparel, except fur	0.054	-0.307	[-0.60, -0.04]
Knitted and crocheted fabrics	0.025	-0.802	[-1.63, -0.36]
Other general purpose machinery	0.023	-0.114	[-0.55, 0.33]
Overall $\beta = -0.146$ (0.043)			

Notes: The table reports Rotemberg weights (α_k) and associated marginal effects (β_k) for industries with the 5 highest Rotemberg weights, for the United States (panel (a)) and Italy (panel (b)). 95% CI is the weak-IV robust confidence interval developed in Chernozhukov and Hansen (2008). Industries are at the 4-digit level and follow the SIC87DD classification in the United States and the ISIC Rev. 3 classification in Italy. Industry-level effects cannot be compared across panels as the number of industries differs. The overall effect (β) is the IV estimate from using the Bartik instrument.

to 5.5% of 1995 manufacturing employment, which is still lower than the effect found by Autor et al. (2013) for the US.

D The indirect effects of Chinese and Eastern European trade on individual careers

Here we test whether our worker-level results are robust to alternative measures of import competition. Similarly to Section 4.3, we augment our domestic competition measure to include either Chinese import competition in foreign markets, or Chinese and Eastern-European import competition in domestic and foreign markets. In this case these measures are attributed to workers directly depending on the industry where they work at the beginning of the period.

In Table D.1 we report the results of these analysis. The outcomes in the different columns are the same as in Table 8, and include both variables related to time spent in employment and variables related to earnings. In Panel (a) we use our augmented measure of domestic plus "indirect" Chinese import competition, while in Panel (b) we use our augmented measure of domestic plus "indirect" Chinese and Eastern European competition.[50].

Similarly to the analysis on local labor markets, we find that, if anything, estimates are slightly smaller in size. This is consistent with the idea that these modified shock measures "scale up" the import penetration measure for the same change in outcome, resulting in lower coefficients.

[50]For details about the construction of such measures, please refer to Section 4.3

Table D.1: The impact of Chinese competition in the domestic and foreign market on workers' careers (2SLS estimates)

	Cumulative Months (1)	Cumulative Weeks (2)	Cumulative FTE weeks (3)	Cumulative Earnings (4)	Cumulative Earnings per year (5)
Panel a: "direct" and "indirect" Chinese competition					
$\Delta IP^{ITA}_{2007-1991}$	0.009	0.054	0.063*	0.002	0.007
	(0.009)	(0.037)	(0.037)	(0.001)	(0.007)
Panel b: "direct" and "indirect" Chinese + East-EU competition					
$\Delta IP^{ITA}_{2007-1991}$	0.008	0.050	0.059*	0.002	0.007
	(0.008)	(0.035)	(0.034)	(0.001)	(0.006)
Observations	692079	692079	692079	692079	690316
Full controls	YES	YES	YES	YES	YES

Notes: The table presents 2SLS regressions of individual labour market outcomes against changes in domestic plus indirect Chinese import penetration. All outcomes are totals over the 16-year period between 1991 and 2007. In column (1)-(3) the dependent variable is the number of months/weeks/full-time-equivalent weeks with at least one day of positive earnings, respectively. For each spell, full-time equivalent weeks are constructed by multiplying the number of weeks worked by the part-time percentage of that contract. In column (4) the dependent variable is the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings. In column (5) the dependent variable is 100× the total of earnings accrued over the 1991-2007 period, in multiples of average yearly 1988-1991 earnings, divided by $(m_i/12)$, where m_i is the dependent variable in column (1). The latter measure can be interpreted as cumulative earnings per 12 months worked, normalized by average initial earnings. All regressions include a constant, and the full set of controls from specification 8. The Kleibergen-Paap F statistic is 313.043 in columns 1-4 and 312.811 in column 5 of Panel (a). The same statistic is 884.442 in columns 1-4 and 885.163 in column 5 of Panel (b). Standard errors are clustered at the 4-digit sector level and reported in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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