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Maurizio Franzini

The Effects of Import Competition on Firms and Workers: Updates and New Adjustment Mechanisms from Italy

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The Effects of Import Competition on Firms and Workers: Updates and New Adjustment Mechanisms from Italy*

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Abstract

We extend the analysis of the effects of increased import competition from China on the Italian manufacturing sector to a longer horizon, including the post-Great recession period up to 2016. We focus on firm outcomes and a new set of workers' outcomes, including the type of contractual arrangements and their mobility across sectors. We find that major margins of adjustment have been workers' transition within and out of manufacturing and the 'downgrading' of contracts within manufacturing to more precarious, shorter-term ones. This resulted in earnings reduction but not employment losses for the average incumbent workers in Italian manufacturing. We find that these mechanisms affected those working in large firms and those with higher skills and initial wages relatively more.

In questo lavoro si indagano gli effetti della crescita delle importazioni dalla Cina sui risultati raggiunti da imprese e lavoratori del settore manifatturiero italiano estendendo l'orizzonte temporale fino al 2016, ovvero dopo la Grande recessione. Ci concentriamo su alcuni esiti delle imprese e su una nuova serie di risultati dei lavoratori, tra cui il tipo di contratto di lavoro e la mobilità tra settori. I risultati mostrano che importanti margini di aggiustamento sono stati la transizione dei lavoratori al di fuori e all'interno del settore manifatturiero e il 'declassamento' della forma contrattuale verso contratti più precari e di breve durata. Ciò ha comportato una riduzione dei salari, ma non una perdita di occupazione. Questi meccanismi hanno colpito in misura relativamente maggiore i lavoratori delle grandi imprese e quelli con qualifiche e salari iniziali più elevati.

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1 Introduction

A large body of research developed during the last two decades has expanded and improved our understanding of the effects of increased import competition and export opportunities on local labor markets, firms, and workers. Several of these studies have used, as a major import-competition shock, the entry of China into the world markets following its entry into the World Trade Organization (WTO).[1] Early papers focused on the 1990-1999 decade, characterized by large growth of Chinese exports. Later studies have extended the analysis to the 2000-2009 decade, up to the Great Recession.[2]

The seminal work by Autor et al. (2013) established negative wage and employment effects of China-driven import competition on manufacturing, analyzing local economies (commuting zones) in the US. Subsequent studies on European countries have partially confirmed the negative results at the local level but generally found more muted impact, relative to the US.[3]

In a subsequent related paper Autor et al. (2014) began extending the analysis from aggregate local labor markets to individual workers' dynamics during and after the shock to understand better the details and the mechanics of the decline in employment and wage of manufacturing US workers in response to the import competition shock. Many studies since then have extended this analysis to other industrialized countries such as Denmark, France, Germany, Italy, Portugal, and others. Thanks to individual administrative longitudinal data, economists have developed detailed analyses of the mechanisms and dynamics activated by the import competition shocks. These studies have followed workers - and in some cases firms - in assessing the impact of import shocks on their outcomes, and developing further the analysis of heterogeneous effects.[4]

These longitudinal studies have shown that, in many countries, individual workers have experienced, over time, lower employment and higher unemployment rates (Dauth et al., 2021; Utar, 2018), and a larger probability of transitioning out of manufacturing, often into services (De Lyon and Pessoa, 2021; Utar, 2018). Slow transitions across sectors and persistent negative effects of employment loss on wages explain a significant share of the negative income effects. On the other hand, there has been limited evidence of geographical mobility in response to increased import competition (De Lyon and Pessoa, 2021; Autor et al., 2014). More recent studies (Dauth et al., 2021) have shown that workers transitioned

[1] For an extensive review of the studies on the labor market effects of the 'China Competition' in high-income countries see Dorn and Levell (2021).

[2] Other studies - e.g., Bastos et al. (2021), Dix-Carneiro and Kovak (2017), Utar (2014) - have analyzed other episodes of opening to trade or trade liberalization on labor market effects.

[3] See Dauth et al. (2014) for Germany, Balsvik et al. (2015) for Norway, Malgouyres (2017) for France, Citino and Linarello (2022) for Italy and the review by Dorn and Levell (2021).

[4] Among the studies having analyzed worker-level effects of the China shock in European countries, see: Keller and Utar (2016) and Utar (2018) about Denmark; Nilsson Hakkala and Huttunen (2016) about Finland; Dauth et al. (2014), Dauth et al. (2017) and Dauth et al. (2021) about Germany; Cabral et al. (2021) about Portugal; Citino and Linarello (2022) about Italy. Among the studies focusing on firms, see: Ashournia et al. (2014) and Utar (2014) about Denmark; Mion and Zhu (2013) about Belgium; Branstetter et al. (2019) about Portugal; De Lyon and Pessoa (2021) about the UK; Bloom et al. (2016) for twelve European countries and Colantone et al. (2015) for eight EU countries.

out of high value-added (high wage) firms, contributing to the negative wage effect. Such analysis has been possible only in a few countries as it requires great detail in the information about employers and employees.

Other studies, following firms, rather than workers, have found an increase in the probability of exit for firms more exposed to import competition (Bloom et al., 2016), and they have identified large firms as particularly vulnerable and negatively affected by the import competition shocks (Colantone et al., 2015; Cabral et al., 2021). Most existing analyses looking at workers and firm dynamics have considered mainly the 1990s and 2000s decade. Autor et al. (2021) argue that the effect of the increased import penetration from China - which for the U.S. peaked in the late 2000s - persisted to the late 2010s decade.

Our paper considers the impact of import competition from China on Italian manufacturing firms and workers, focusing on the more recent period 2001-2016. This paper expands the analysis of the previous literature in three important ways.

First, we consider the post-Great Recession period. Therefore, we extend the analysis of the impact of import exposure on firms' and workers' outcomes in the long run and after the Great Recession, which is new.

Second, after confirming the existence of important mechanisms of adjustment already established for Italian manufacturing workers, such as the transition to other sectors and limited geographic mobility response,[5] we focus on several additional events relative to the individuals' working history. In doing so, we highlight some new mechanisms: the transition of workers to different sectors within manufacturing and, to a lower extent, to sectors outside manufacturing and self-employment. We document the contractual downgrading to less secure or paid job arrangements, such as temporary and part-time contracts. Despite workers in sectors more exposed to increased import from China did not experience a decline in employment, as captured by worked weeks over the observed period, these transitions were associated with significant earnings decline. Moreover, such decline is stronger for workers with higher occupations and wages, especially those who initially worked in larger firms. The latter is an interesting result as smaller firms in Italy are subject to less stringent labor regulations, usually pay lower salaries, and face higher chances of under-declaring their income. The smaller wage impact for workers in smaller firms and with lower initial salaries is consistent with such a group being less exposed to international competition and more to local. Additionally, consistently with Dauth et al. (2017), workers from higher-paying firms might lose more when they move out of the original firm, even if they can quickly relocate to other firms or sectors, as the quality of the new firm is lower and pay less for their experience.

Third, our study is the first to inquire about firms' responses to increasing competition from China, and, consistently with the evidence about workers, we document, at the firm level, a stronger effect of import competition on larger firms. Regarding death probability, the increased import competition affected similarly large and small firms, but large firms have a much smaller death rate on average. Additionally, employment decline was stronger in large firms. The stronger negative impact on large firms and the tendency of workers to relocate within manufacturing can be seen as a way for the local economy to reduce labor costs vis-a-vis the import competition. At the same time, it characterizes the shock as a reallocation of workers within manufacturing, even more than between manufacturing and other sectors.

[5]See Citino and Linarello (2022) who analyzed the impact of the Chinese import penetration on Italian workers in the 1991-2007 period

Italy is an interesting case study, as a country competing on manufacturing exports (Italy was the second-largest manufacturing goods exporter country in the European Union, after Germany when China entered the WTO in 2001), with relatively strong worker protection and centralized bargaining, especially in larger firms, but also with a tradition of productive and dynamic small-medium firms creating many jobs.[6] In such an environment, the sudden increase in import competition might have constituted a particularly negative shock for large, regulated firms, usually providing more paid and secure jobs while small firms, exploiting looser regulation, favorable tax regimes, and more margins for informality, remained competitive.[7] The high mobility within and (even if to a lower extent) out of manufacturing might have helped workers to keep employment but at the cost of moving to less productive firms, less secure contractual arrangements, and reduced wages.

Our data originate from several administrative databases from the Italian National Social Security Institute (INPS). At the firm level, we track from 2001 to 2016 all private firms active in manufacturing with at least one employee at the end of 2001. At the worker level, we focus on employees working in manufacturing in 2001 and follow their labor market history up until 2016. Worker-level data contain information on all their employment spells, including in the private and public sector and as self-employed, thus allowing us to track their working histories fully.[8] We also observe wages, individual characteristics, broad occupation, and type of contract. These data are merged with firm-level data that include information on location, sector, size, age of firm, and aggregate workers' characteristics.

One novelty relative to most of the literature is considering the period 2001-2016 as the main focus of the analysis. As we will show, the import penetration of Chinese exports to Italy experienced a significant and sharp increase starting in 2001, reduced after the 2008 crisis and the 2011 second dip, and only partially recovered before 2016. We control for sector trends in the 1981-2001 decades but focus the analysis on the period of the largest growth of import penetration from China, beginning in 2001 and lasting up to 2016, after the Great Recession. This longer-term analysis will help establish whether the dynamics of import competition effects persist in the long run and over serious recession shocks rather than only in the 2000-2009 decade that was analyzed in most of the previous studies.

Our empirical strategy and identification build on the one used in Autor et al. (2014) and relies mainly on 'long-cumulative differences' of the dependent and the explanatory variables. As dependent variables, for each worker in the dataset as of 2001, we construct a series of cumulative outcomes from 2001 to 2016 about wages and worked weeks in the various sectors and a series of dummies capturing sector, firm, or regional mobility and the change in working status or contractual arrangements between 2001 and 2016. We then regress these variables on the cumulative import penetration measure up to 2016 for the sector where the worker was in 2001 as an explanatory variable. Similarly, for firms, we consider as dependent variables a survival dummy up to the year 2016 (we also investigate survival probability before the beginning of the Great Recession) and, for survivor firms, cumulative wages, total employment, and the blue-collar share of employment also up to 2016. For some crucial events, we also consider a dynamic analysis for each year, using as a dependent variable the change of the firm or worker status at least once between 2001 and year t with $t = 2002, ...2016$ regressed on the cumulative import penetration from 2001 to year t obtaining the 'dynamic response' of these outcomes. In the baseline analyses

[6] According to OECD (2023), small and medium enterprises employ about 70% of Italian workers.

[7] Matano et al. (2023) find that the import surge decreased contractual minimum wages by 1.5% in Italy from 1995 to 2003.

[8] This improves on Citino and Linarello (2022) who only have access to private sector working spells.

about cumulative outcomes and mobility dummies, the import penetration is calculated as the change in the import value for the sector between 2001 and 2016 divided by the employment in the sector in 1991. Likewise, in the dynamic analysis, the import penetration is calculated as the change in the import value for the year-sector between 2001 and year t with $t = 2002, ...2016$ always divided by employment in the sector as of 1991. Following, among the others, Autor et al. (2013) and Dauth et al. (2014), to alleviate concerns of endogeneity of sector imports of Italy from China, we instrument them using imports in top non-European five world economies (US, Canada, Australia, New Zealand, and Japan).

Two interesting facts emerge from the dynamic analysis. First, at the firm level, negative employment effects emerge slowly and significantly only after ten years. This implies that the analysis relative to 2000-2008 underestimated the long-run effect of import competition from China. Hence, consistently with the results in Dix-Carneiro and Kovak (2017), we find a decline in firm-level employment, especially in the long run. Second, at the worker level, there is strong evidence of higher mobility across manufacturing sectors for workers employed in sectors with large import penetration. Such a response begins in the early years of the increased import penetration and persists in the long run.

To provide a quantitative assessment of our findings, the survival probability over the full period declined by 1.4 percentage points per year, comparing firms in sectors at the 75th and the 25th percentile of change in the import penetration measure from China. Additionally, comparing surviving firms at the 75th and the 25th percentile of the change in import penetration measure, the number of employees and the share of blue-collars declined by 2.2% and 1.6% per year in the first group relative to the second. Comparing workers in sectors at the 75th percentile with those in sectors at the 25th percentile of the change in import penetration, the first group suffered a 0.37% earning loss per year, had a 3.4 percentage-points (p.p.) higher probability to move at least once from 2001 to 2016 within manufacturing and a 1.3 p.p. higher probability to move out of manufacturing relative to the second group. They also had 1.2 and 0.8 p.p. higher probability of moving to fixed-term and part-time contracts, respectively. Moreover, as noted, for a given exposition to the China shock, the risk increase was larger for those employed in larger firms, which usually provide more paid and structured contracts. Results about workers employed in different-sized firms are thus consistent with the findings of the heterogeneity analysis on the effects of the China shock on small vs. large firms.

Overall, we find that the mechanism of workers' transitions within manufacturing (and, to a lower extent, to services and self-employment) and towards jobs with less stable contractual arrangements and lower salaries absorbed the long-run effects of the China import competition, while we do not see evidence of significant aggregate job losses and unemployment. This new result, possibly driven by Italian institutional arrangements and firm structure, enriches the possible effects of import penetration on workers.

The rest of the paper is as follows. Section 2 shows the main trends of import penetration in Italy as well as data about major labor market indicators in the observed period, Section 3 describes the firm-level and worker-level data we use, and Section 4 presents the empirical and identification strategies. Then, Sections 5.1 and 5.2 show the main results about firms and workers, respectively. Section 6 concludes framing our findings within the literature on import competition from lower-income countries.

2 The Italian context

To capture and analyze the "China shock" to the Italian economy, we use data from the UN COMTRADE database,[9] that collects imports and exports at the 3-digit NACE sector classification code. We use data on imports without distinguishing final and intermediate goods.[10]

Figure 1 shows the time series, from 1991 to 2016, of Italian imports from China (panel a), EU14 (i.e., EU15 minus Italy) imports from China (panel b), and EU14 imports from Italy (panel c), by aggregate sectors. Starting from the 1990s, Italy experienced a sharp rise in import penetration from China even if, like the other EU15 countries, the bulk of such rise emerged after the entry of China into the WTO in 2001. Figure 1 reveals that the increase in imports in Italy (as well as in the EU15) was rather heterogeneous across sectors. The increase in value was much larger in sectors like "Textile" and "Machinery" than in other sectors (such as petrol-chemicals or food products). Additionally, a comparison between the first two panels indicates that while EU14 imports from China recovered the pre-Great Recession trends by 2012, Italy experienced a second decline in imports due to the 2011 sovereign debt crisis, which was strong in Southern Europe. The last panel shows that after the sovereign crisis of 2011, the exports of Italy towards the rest of the EU (imports of EU14 from Italy) declined.

Another interesting set of facts relative to the evolution of Italian manufacturing in 1991-2016 is shown in Figure 2 (based on INPS data on the universe of firms and employees in private manufacturing companies). Both the number of active firms and the number of workers employed in manufacturing were still growing as of the early 2000s, and then started declining and continued to do so till 2016, experiencing a -20% change from the peak. The period of entry of China into the WTO corresponds to the beginning of the decline. Finally, the share of blue-collar workers has declined since 1997 (by approximately six percentage points from the maximum to the minimum value). These three indicators show a sector in absolute decline since the early 2000.

At the same time as these structural trends were developing in the Italian manufacturing sector, important labor market reforms took place. Until the mid-1990s, the Italian labor market was strictly regulated and characterized by a high level of rigidity in comparison with most other European Countries. According to the OECD Employment Protection Legislation (EPL) index, Italy ranked fourth as the most rigid within EU15 countries in 1995. However, from the 1990s up to the 2000s, several reforms were introduced to increase the flexibility of contractual arrangements (Boeri, 2011). These reforms first expanded the scope of fixed-term contracts and introduced temporary work agencies; afterward, they increased the potential duration of fixed-term contracts and introduced new types of temporary contracts (e.g., project collaborations, job-on-call, staff leasing). While these contracts generated jobs with higher flexibility and probability of leaving and entering them, no changes concerned - up until two reforms implemented in 2012 and 2015 - which remained strongly regulated, especially in their provisions for termination and individual and collective dismissals in medium-large firms (those with more than 15 employees).[11] Thus, the reform

[9] This dataset is copyrighted by the United Nations, freely available upon registration on the website of the United Nations Statistics Division (UNSD, see `http://comtrade.un.org`).

[10] All UN COMTRADE monetary values measured in US dollars were converted into current euros using the official yearly conversion rate published by Eurostat. This allowed the same currency as other national archives that we used and described in the next section.

[11] For a review of Italy's labor market reform process since the 1990s, see Raitano and Fana (2019).

process created two-tier labor markets in which flexible and permanent contracts coexist (Boeri, 2011). Hence, the increase in labor market flexibility occurred in a specific segment of the labor market: that of temporary, entry-level, atypical contracts, while open-ended employees remained protected, especially those employed in firms with at least 16 employees that had to follow stricter labor market rules. An example is that during our period of analysis (up until 2015), firms with at least 16 employees were required to reinstate workers in case of unfair dismissal due to economic reasons, while firms under the 16 employees threshold were subject to less tight rules and could fire workers paying them a limited fee in case of a sanctioning for unfair dismissal. Additionally, small firms very rarely adopt second-level decentralized bargaining to implement wages established by the national centralized bargaining.[12]. Finally, a simple organizational structure might increase the chance of collusion between firms and employees for tax evasion to reduce the overall tax burden(Kleven et al., 2016), possibly also aimed at increasing the chances to remain competitive.

So, in the same period as the increased trade competition was taking place, the Italian labor market was also experiencing an increase in the diffusion of atypical, short-term entry contractual arrangements. According to INPS data, the share of employees in the private sector with a part-time contract rose from 12.8% to 29.4% from 2001 to 2016. Likewise, the share of private employees with a fixed-term contract in their main job spell in the year rose from 14.7% to 20.9% from 2001 to 2016. Both manufacturing and service firms used these types of contracts. The share of workers employed in the Service sector slightly rose from 61.5% (in 2001) to 65.0% (in 2016). Consequently, we will consider the differential response of smaller and larger firms to trade shocks to suggest how the different intensities of labor market regulation may have affected the firms' adjustment to those shocks.

3 Data

We use administrative data from the Italian Social Security Institute (INPS), which provides longitudinal information on the universe of private firms and all individuals employed in Italy and the link between them. We use firm- and individual-level information and construct an employer-employee dataset using firms' and individual unique identifiers. Data on firms' wage bills, employment, and employment composition in blue and white-collar workers are from the Firms' database. Data on individual employment, occupation, mobility, type of, and duration of contracts are from the employee's database [13]

The data on import penetration from China are constructed using the UN COMTRADE industry imports data, based on the 3-digit SITC classification, merged with the Italian industry classification that is converted in the 3-digit NACE rev. 1.1 codes using the crosswalk tables provided by the World Bank (see https://wits.worldbank.org).

Finally, we use the 1981 and 1991 Italian Census (Italian National Statistical Institute) of manufacturing to measure the local industry composition used to construct the import competition shock.

[12] According to INPS data for 2016, workers in firms with at most 15 employees earn on average 34% less than those in firms over the 16 employees threshold (the gap reduces to 27% when the focus is on full-time workers only)

[13] Access to INPS administrative data is provided through the 'VisitINPS scholars' program. Details can be found at `https://tinyurl.com/4tkn2wv5`.

3.1 The INPS dataset on private firms

The sample for the firm-level analysis uses the INPS data on firms, including all private firms with at least one employee active in manufacturing at the end of 2001. We then track these firms until their possible disappearance from the database (which implies the firm's death) and until 2016 for the surviving firms. This group will be called the "incumbent manufacturing firms" as they exist during our shock. These data include over 270 thousand firms and information on their mean annual number of employees, their province of location, the main sector of activity (3-digit NACE Rev. 1.1 industry codes), the type of firm (individual firm, parent or affiliate) and the date of birth and death.

These data can be matched each year with their employees, using the universe of workers and unique firms' and workers' identifiers. Such a merge allows us to compute a set of firm-level averages of the characteristics of employees, such as weeks worked, wages, as well as the firm's composition in terms of gender, age, citizenship, experience, tenure in the firm, broad occupation, and type of contract.[14] The employer-employee matched database was then collapsed by firms and year to obtain the final firm-level panel database.[15]

The summary statistics for the main firm-level variables are reported in Table 1. It shows that, overall, 35.3% of firms active in 2001 survived until 2016 (96,519 out of 273,239); The survival probability is 33.4% for small firms (at most 15 employees in 2001) and 44.5% among large firms (more than 15 employees in 2001). It is larger in the North than in the Centre and South. The average employment size of firms in 2001 was 14.6, while the size grew to an average of 19.1 among the surviving firms. This emphasizes the small average size of firms in Italy, potentially also for the advantages in terms of labor market regulation for firms with fewer than 15 employees and their higher chances for under-declaring their revenues, which we described in section 2.

3.2 The INPS dataset on employees

The individual-level longitudinal data include all employees in the private sector aged between 15 and 64 working in manufacturing in 2001 (nearly 4 million workers; henceforth, the "incumbent manufacturing workers"). We followed their working history and each job spell from 2001 until their possible retirement, dismissal, or death and not later than 2016.[16]

We follow individual workers using their unique identifiers. We combine several administrative datasets to have information on their demographic features (e.g., age, gender, citizenship), [17] and on their full working history since their entry in activity. The employment information of each worker includes, for each year, their contractual arrangement (full-time vs. part-time, open-ended vs. fixed-term), their broad occupation classification (distinguishing blue-collars, white-collars and managers), the employment duration (in weeks), and the gross earnings in each job-spell[18]. We also observe the weeks spent receiving the short-term

[14] Yearly firm-level averages and composition were computed by weighting employees' characteristics by their worked weeks in the firm in the year.

[15] The panel is unbalanced since firms active at the end of 2001 may close (i.e., "die") in the 2002-2016 period. Also, note that we drop from the panel those very few firms that changed their 3-digit NACE sector in the observation period (the changing sector year thus becomes the firm's death year).

[16] In the other study about Italian workers (Citino and Linarello, 2022), the workers' sample is selected according to their age and experience in each year.

[17] To this aim, we merged data on private employees working spells with information in the *Estratti Conto* archive, which records information on all employment spells also out of the private employment (i.e., in public employment or self-employment).

[18] In INPS data, incomes are recorded gross of personal income taxes and social contributions paid by the

work compensation allowance (*Cassa Integrazione Guadagni* - CIG), and the type of employment (i.e., public sector, private sector or self-employed).[19] These data allow us to track individuals' mobility across sectors, types of jobs, and contractual arrangements. This feature has rarely been exploited and is important in our analyses, as mobility across contract types is a relevant component of job stability and can be an important margin of adjustment from a firm point of view.

The database on the working histories of the incumbent manufacturing workers is then merged, using the employer identification number, to the INPS archives on all private firms described above, thus adding to individual data main information about the firm where he/she works (e.g., sector, size, and type, province of location). Since our database records information about all job relationships experienced by the incumbent manufacturing workers before 2001, we compute exact working experience, experience in specific 3-digit NACE sector, and tenure in the firm (all these variables are measured in weeks).[20]

The main characteristics of the selected workers in 2001 are reported in Table 2, which shows that most of the employees in manufacturing were males (68.4%), blue-collars (74.0%) and employed in Northern Regions (69.0%). Nearly two-thirds of them worked in small firms, and more than half had less than five years of tenure in 2001.

4 Empirical strategy

4.1 Regression specifications

We estimate the effect of the increased industry exposure to import penetration (IP) from China on a large set of firms' and workers' outcomes over the period 2001-2016. We follow the basic identification strategy used in several recent studies assessing the impact of Chinese import competition on firm or worker level effects [21]. Specifically, we first consider outcomes as a set of cumulative values of variables measured at the firm or the individual level over the whole period (2001-2016). These outcomes are normalized concerning the base year 2001 value and divided by the number of years T_i the individual or the firm was active during the observed period. Such a construct generates the average cumulated growth of the variable over the 2001-2016 interval. The estimated specification is as follows:

$$\sum_{t=1}^{15} \frac{y_{ij,t+2001}}{T_i \cdot y_{ij,2001}} = X'_{ij2001}\beta + \gamma \Delta IP^{CHN}_{j,2016/2001} + \delta IP^{CHN}_{j,2001} + \epsilon_{ijt} \tag{1}$$

where the starting year is 2001, and the time index ranges for $t = \{1, 2, .., 15\}$; j is the sector of activity, and i is the unit of analysis, i.e., either firms or workers.

The main independent variable is $\Delta IP^{CHN}_{j,2016/2001}$, measuring the average yearly change in import penetration from China between 2001 and 2016 in industry j. We also control

worker and also include possible compensations for overtime hours. These data do not include worked hours, detailed occupations, job tasks, and educational attainment.

[19] When an individual has more than one job relationship in a year, we take the longest one to capture the working status in that year (e.g., the occupation, the contractual arrangement). We consider instead all job relationships to compute worked weeks, experience, tenure, and earnings.

[20] The analysis in Citino and Linarello (2022) only tracks individuals when they work as an employee in the private sector and then misses to consider spells of public sector work or self-employment as different from non-employment.

[21] See, among the others, Autor et al. (2014); Dauth et al. (2021, 2014); Citino and Linarello (2022); Utar (2018); Cabral et al. (2021); De Lyon and Pessoa (2021)

for $IP^{CHN}_{j,2001}$, which is the import penetration from China in sector j at the beginning of our observed period, while X'_{ij2001} is the set of individual, firm and sector level controls in the starting year.

The second set of outcomes is a set of 'indicator' variables that capture important transitions relative to the status in the year 2001 that occurred at least once from 2002 to 2016. They take a value of 1 or 0 and will alternatively capture the firm's survival and individuals' transition across working statuses or types of occupations. These indicators capturing major transitions over the period are regressed on the same set of independent and control variables included in (1) as follows:

$$I_i \left[\sum_{t=1}^{15} (y_{i,t+2001} - y_{i,2001}) > 0 \right] = X'_{ij2001}\beta + \gamma \Delta IP^{CHN}_{j,2016/2001} + \delta IP^{CHN}_{j,2001} + \epsilon_{ijt} \qquad (2)$$

The specific outcomes $y_{i,t+2001}$ will be introduced and discussed in Section 4.3, and their list is in Table A.1. In alternative specifications that we report in the Appendix, we consider the estimation of outcomes for each year from 2002 to 2016 by regressing the change in the firm/worker outcome from 2001 to year $2001 + t$ on the change in the indicator of sector import penetration from 2001 to year $2001 + t$. This provides an estimate of the dynamic evolution of the effects of import competition.

We include a large set of firm-specific and individual-specific controls measured in 2001, including the size, age, and variables capturing the firm composition and several worker demographic characteristics. Those control variables are detailed in Table A.2. Additionally, we include as controls the trend of industry's employment before 2001 and the change of import penetration from Eastern European EU member states ($\Delta IP^{EEU}_{j,2016/2001}$) and its initial level ($IP^{EEU}_{j,2001}$) to capture possible confounding trends of import penetration from Eastern Europe, which was becoming more integrated to Western Europe in this period.[22] The error term ϵ_{ijt} is clustered at the industry level (defined at the 3-digit NACE code), as the explanatory variable varies by industry, and we like to capture correlation across firms within the industry. All firm-level regressions are weighted for the firm's employment share in 2001 to capture how responses by the firms to the China shock have affected the Italian labor market.

4.2 Exposure to Import Penetration and identification strategy

To measure the increase in import penetration from China from the year 2001 to 2016 across sectors j, we follow Autor et al. (2013) and define:

$$\Delta IP^{CHN}_{j,2016/2001} = \frac{\Delta M^{ITA,CHN}_{j,2016/2001}}{L_{j,1991}}, \qquad (3)$$

where $\Delta M^{ITA,CHN}_{j,2016/2001}$ is the observed change in Italian imports from China in Euros in the industry j between 2001 and year 2016. Imports are then normalized by the employment level in each industry reported in the 1991 Firms' level Census, ten years before the beginning of the period analyzed. This should reduce the correlation with post-2001 economic shocks and issues due to the simultaneity bias of firm performances and trade growth. The

[22] Eastern EU countries include Bulgaria, Czechoslovakia (Czech Republic and Slovakia since 1993), Estonia, Latvia, Lithuania, Poland, Hungary, Romania and Slovenia.

constructed variable is then normalized by dividing by the standard deviation in 2001 to interpret the estimated coefficients more straightforwardly.

The variation of sector-specific import penetration in (3) might also capture demand-driven (technological, productivity, or efficiency-driven) import shocks to national industries. Hence, the OLS estimates of 2 and 1 shown in Section 4.1 might produce a biased estimate of the effect of the growth of imports from China on firms' and workers' outcomes. To correct for this issue, we follow Autor et al. (2014) and the following studies (e.g., Dauth et al. (2021)) and instrument the change in import penetration per worker (normalized by its standard deviation is 2001) using the change in Chinese imports from five non-European high-income countries (i.e., the US, Canada, Japan, Australia and New Zealand) rather than from Italy.

$$\Delta IP^{WL5,CHN}_{j,t+2001,2001} = \frac{\Delta M^{WL5,CHN}_{j,t+2001,2001}}{L_{j,1991}} \tag{4}$$

The assumption is that industry-specific demand shocks for extra-European economies are not strongly correlated with those affecting Italy in the same period. We excluded other developed non-EU European countries, such as Switzerland or Norway, as the market of goods is strongly linked in Europe, and demand shocks in a country could affect nearby countries both in the EU as well as outside of it[23]

To check the validity of our industry-level instrument, we run a set of pre-trend tests where we regress – considering the 3-digit NACE levels as the unit of analysis – our IV on the change in the (log) number of employees in the industry of the (log) number of firms and of the number of employees per firms in the industry from 1981 to 1991 - first, third and fifth columns - and from 1991 to 2001 - second, fourth and sixth column - using firms' Census data. Table 4 shows the estimated coefficients. We do not see any significant correlation between the IV and pre-2001 trends. One has to take these checks cautiously, as the power may be limited due to only 87 to 90 sectors included in the analysis and the lack of precision of the estimated coefficient. Nevertheless, it is reassuring that correlations are small and partial R-square is very low.

4.3 The outcome and the control variables

We include The firm-level outcomes in equations 1 and 2 as follows. The first is survival probability, captured by a dummy equal to 1 if the firm is still active from 2001 to 2016. We then construct as outcomes for the sample of 'survivor' firms in each year three cumulative growth outcomes from 2001 to 2016 concerning the firm's total wage bill since 2001, the number of employees, and the share of blue-collar workers, all relative to the 2001 value and normalized by 15 (the duration of our observation period) to have average yearly growth; see Table A.1 for a full description of the variable used).

For the analysis at the worker level, we first focus on the cumulative growth of six outcomes measured from 2001 to 2016 (Table A.1): i) the number of years spent with the 2001 employer; ii) the number of years spent within the sector of employment in 2001; iii) the number of years spent in the manufacturing sector (as all people in the sample started in manufacturing); iv) the number of years spent working as an employee in the private sector (as opposed to the public sector or in self-employment or unemployment); v) the total number of worked weeks; vi) total gross earnings relative to 2001 earnings.

[23]Let us notice that the variation we use is across sectors, not a shift-share across regions. Hence, we directly test IV's correlation with pre-2001 trends of economic variables.

These cumulative outcomes are normalized by the number of years spent in activity (i.e., before retirement or death) over the period, except for total earnings, which are normalized concerning the number of years spent in private employment only.[24]

The 'transition indicator' for workers captures the probability of changing employer, sector of activity or employment status, region of residence, or contractual arrangements or a drop in unemployment (for details, see Table A.1) by the end of the period.

Finally, in terms of control variables (Table A.2), we include the lagged value of the dependent variable, province fixed effects, pre-trend in the sector employment in the form of changes and levels in 1981, 1991, and 2001 and changes over time of the industry's import penetration from Eastern European countries. Those controls are included in all regressions. In firm-level analyses, we also control for firms' characteristics in 2001 (type and polynomial on age and size), for the employment composition in 2001 (shares of employees by gender, age, citizenship, occupation, type of contract, tenure, total experience and experience in the industry) and mean annual wages and worked weeks in 2001. In worker-level analyses, we also controlled for individuals' demographics (gender, age, citizenship) and employment characteristics (work experience, experience in the sector, tenure in the firm, contractual arrangement, and broad occupation) in 2001.

All monetary values (i.e., wage bills for firms and earnings for workers) are considered in real Euros (nominal values were deflated using the harmonized index of consumer prices).

Table 3 shows mean values and standard deviations of the firms' and workers' outcomes, which we consider dependent variables. Regarding firms, the wage bill and the number of employees grew by 11% and 3% respectively between 2001 and 2016, considering only survivor firms, while the share of blue-collar workers on average declined by nearly 8.5%. On average, the years spent in the 2001 firm and sectors are 8.7 and 10.4, respectively (out of the 16 years analyzed), implying a significant number of workers moving across sectors. Moreover, 46.3% of workers experienced at least a change in the firm from 2001 to 2016, 42.7% moved out of manufacturing, and 27.1% moved in different manufacturing sectors. Contractual mobility is also high: the shares of workers who had at least a working spell over the period as a fixed-term or a part-time employee were 33.2% and 26.8%, respectively. Conversely, regional mobility was limited, as only 9.3% of workers moved among Italian regions. 20.8% of workers spent at least one year without working between 2002 and 2016, and cumulative real earnings declined relative to the 2001 wage by more than 3%.

5 Empirical results

In this section, we show the IV estimates of the coefficient of interest, capturing the impact of import penetration from China on several outcomes[25]. The estimates using OLS regressions are shown in the online appendix. In general, the results from the OLS estimates are smaller in absolute value than those from IV estimates. This implies an attenuation bias of OLS, which usually indicates that omitted shocks (in our case, likely demand shocks) were negatively correlated with the shock from increased competition following China's entry into the WTO. Sectors with more penetration from China, that is, were usually those with better productivity and efficiency performance, and this, in an OLS environment, attenuates the negative impact of the import competition shock.

[24] Earnings information is reliable in our dataset for periods spent in private employment.

[25] Regressions in the firm level analysis are weighted by the firm's size. Unweighted regressions result in very similar estimates.

5.1 Firm-level results

We begin in Table 5 by showing the effect of the increased import competition on the firms' survival (survival rate) probability. We first show the impact, including only the years before the Great Recession (2001-2007) in Column 1 and then the whole period (2001-2016) in Column 2. The coefficient can be interpreted as the cumulative impact of an increase in import penetration from China by one standard deviation on the probability of survival over the considered period. We notice that the shock did not have a significant effect on the average incumbent firm's probability of survival in the early years of the 2000s up to the Great Recession. However, when considering the whole period, we find that firms in a sector receiving an import competition shock larger by one standard deviation experienced a lower probability of survival by 1.8 percent. As the average probability of survival during this period was about 35 percent, the decline in such a probability associated with import competition is non-trivial. Two considerations are needed. First, as the effect seems to emerge over time with the accumulation of the shock, studies that only consider a shorter period, even one decade, may miss some of the longer-run effects. Most analyses of the import competition shocks are limited to the 2000-2007 period (De Lyon and Pessoa, 2021; Branstetter et al., 2019; Citino and Linarello, 2022). Relative to those studies, our paper adds a more current perspective and emphasizes the importance of considering a long-run and post-recession period. The second consideration is a caveat and comes from the fact that the F-test of the IV is rather small when considering the 2001-2007 period, and weak instrument concerns may arise. The lower ability of the IV to predict the shock in the shorter run may reduce our power to estimate such an effect.

The additional three columns of Table 5 show the effect of the shock on the average surviving incumbent firm's wage bill, employment, and share of blue-collar workers. One standard deviation higher import penetration generated a 3% yearly percentage points reduction in the wage bill, a 2.8% reduction in employees, and a 2% reduction in the share of blue-collar. The surviving firms had to shrink in size and reduce the number of their workers (and proportionally their wage bill). This employment loss happened in larger proportion for blue collars, whose share dropped. Both the finding of increased firm exit and decline in firm employment from import competition shown in Table 5 are consistent with the estimates of similar shocks in the UK (De Lyon and Pessoa, 2021), Denmark (Utar, 2014), Portugal (Branstetter et al., 2019) and Belgium (Mion and Zhu, 2013). In most analyzed cases, the increase in import competition in a sector produces a reduction in the probability of survival of firms, and, for the surviving firms, it generates declines in size and employment.

Another way to quantify the magnitudes of these effects (facilitating comparison with studies such as Autor et al. (2014) and Dauth et al. (2021)) is to report the difference in outcomes of two representative firms (or workers in Section 5.2) in sectors with exposure at the 75th and the 25th percentile of the distribution of import penetration increase. As such difference is equal to 3/4 of the S.D. of the independent variable, they imply a larger 'death' probability by 1.43 percentage points. Among the survivor firms, we find a 2.2% lower number of employees per year, 2.5% lower wage bill per year, and 1.6% lower share of blue collars for those in the 75th relative to those in the 25th percentile of import penetration.

To have a fully dynamic representation of how these effects on firms' employment and blue-collar shares emerge over the 2001-2016 period, we show in Figure A.1 and Figure A.2 of the appendix, the cumulative estimated effect for each year. In the figures of the left panel, we include in the estimation all firms surviving up to that year. In the dynamics reported in the right panel, we only include the subsample of survivors from 2001 to 2016.

The 'yearly' effects of the import penetration shock on the share of blue-collar started to be statistically significant in 2007, the beginning of the Great Recession. The effect on total firm employment becomes statistically significant only at the end of the observed period. Firms may have had some margin of adjustment in reallocating production and shedding less skilled workers in the early phase that avoided shrinkage of employment and, for a period (up to 2007), also reduced death rates. However, the negative impact emerged in the long run and after the recession.

Table 6 shows our analysis's important and original dimension. In it, we report the estimates of import penetration on the previous outcomes (firm survival, wage bill, employment, and share of blue collars), separating firms by their initial size in 2001. We use 15 employees as the limit for a small enterprise, corresponding to the threshold for the more lenient rules on labor regulation. The first two columns of Table 6 show that the impact of the import penetration shock on death probabilities of smaller and larger firms is similar in percentage points. However, as the first group is characterized by a significantly smaller average survival probability (namely 33.4% versus 44.5% in the considered period), the "death risk" relative to the mean (as a percent of the mean) is 1.1 percentage points larger for the large firms than for the small firms group. Additionally, among survivor firms, those with at least 16 employees suffered a significant and larger drop in their wage bill relative to small firms that did not experience such effects and a significantly larger decline in the share of blue-collar employees.

This set of results proves that the larger firms suffered more deeply from the import competition shocks. This denotes the resilience of small firms in Italy, as they can take advantage of higher "output flexibility" and possibly be able to fill production niches, enjoy lower labor market rigidity, a higher chance to under-declare costs – especially if their bargaining power with employees allows them to reduce their wage bill – and more favorable taxation of profits.

5.2 Worker-level results

In Table 7, we show the effects estimated following individual workers for the whole period 2001-2016, conditional on working in manufacturing in 2001. The outcomes are time spent in a certain 'status' during the whole period (e.g., in the same firm or sector as 2001). The coefficients measure the impact on such cumulative outcomes from one standard deviation higher import penetration in the sector. The first three columns of Table 7 show the effect on years spent in the same firm where the worker was in 2001, in the same sector (within manufacturing), in manufacturing, and private employment. A "out of private employment" movement implies a transition to public employment, self-employment, or non-employment. In the last two columns, we show the effect on the total yearly worked weeks and on the cumulative yearly earnings from 2001 to 2016 as a percent of initial earnings.[26]

We find that in sectors with one standard deviation higher exposure to Chinese import competition, workers reduced the time spent in the same sector by 2% and in private employment by 0.4%. Namely, they were more likely to transition earlier, relative to lower exposure sectors, to another sector or out of the private sector. While the first column shows that incumbent individuals were not more likely to leave the firm of employment (in 2001), those who left were more likely to leave the sector and overall leave private employment. Quantifying the main effect, an individual employed in a sector at the 75th percentile of the

[26] As noted, the values of these variables are normalized into yearly values, and earnings are also normalized by the initial, 2001, value. See Table A.1 for a detailed description of the dependent variables.

import penetration distribution worked approximately 3.3 months less in the 2001 sector than an individual employed in a sector at the 25th percentile of the distribution of our measure.[27]

However, workers more exposed to the China shock did not show fewer working weeks from 2001 to 2016, implying that a higher probability of transition did not affect their employability. Relative to the analysis of Citino and Linarello (2022) focus on some of the same outcomes in 1991-2007, we do not find a positive impact on total weeks worked. This might have been a temporary effect. Consistently with them, however, we find a higher probability of transitioning to another sector or out of private employment. We find a significant reduction in total earnings from 2001-2016 for workers more exposed to that shock, while they do not find a significant effect for the 1991-2007 period. The effect we estimate on earnings is quite small and much lower than that found by Autor et al. (2014) for the US. The gap between a manufacturing worker at the 75th percentile of sector exposure to China imports and one at the 25th percentile of exposure amounts to cumulative earnings reductions equal to -0,37% per worker year, i.e., approximately 5.6% over 15 years, while US estimates by Autor et al. (2014) report a cumulative earnings reduction of 46% of initial yearly income along the 1991-2007 period for P75 concerning P25.

The decline in earnings was not associated with a reduction in weeks worked but rather with more likely transitions out of the sector and out of private employment. Transitioning could imply a loss of sector-specific human capital and worsening contractual arrangements for workers who left the original sector. As private employment, particularly in manufacturing, can imply better contractual arrangements, a possibility for the deterioration of earnings is the move towards fixed-term or less stable working contracts. A decrease in cumulative earnings might also be due to lower wage dynamics experienced by sectors more exposed to the increase in China imports and/or to a reduction in the number of overtime hours worked in sectors whose production slackens because of the increasing competition with Chinese goods.

To provide further insights into the career patterns experienced by workers more exposed to the China shock, we then investigated whether higher exposure to import penetration from China affected the incumbent workers' probability of moving at least once from 2002 to 2016 (Table 8). We then analyze whether it affects the probability of a contractual 'downgrading' or higher risks to experience spells with no labor income (Table 9).

From Table 8, we see that, while mobility out of the original firm was not significantly affected by import competition (column 1), workers in more exposed sectors experience significantly higher mobility both from one sector to another within manufacturing (Column 3) and from manufacturing to services (columns 2 and 4). The quantitative impact implies that those in sectors at P75 of import penetration had a higher probability by 1.5 percentage points to move to services concerning those at P25. The probability of moving from manufacturing to public employment or self-employment was 1.3 percentage points higher for those in P75 than those in P25. The largest effect is mobility within manufacturing, shown in column 3. Import penetration exposure at the 75th percentile increased the probability of moving to another sector in manufacturing by 3.4 p.p. relative to exposure at the 25th percentile. The 'year-by-year' dynamic analysis of the probability of moving to another sector, shown in Figure A.3, confirms the significance of such a response. The probability of moving to another manufacturing sector increased over time and became statistically significant in

[27]The quantification is obtained by expressing the coefficient in terms of the P75-P25 difference in our measure of exposure to the China shock and then converting this coefficient in terms of months in 15 years.

2009. In additional analysis (available upon request), we inquire into the 'direction' of such within manufacturing mobility. We find, however, that the probability of moving was not higher towards sectors less exposed to Chinese imports nor that those workers were more likely to move across regions. These results suggest a 'push' out of sectors affected more strongly by competition but no directed mobility (across sectors or regions) to alleviate the problem in the long run. Nonetheless, the move to service or self-employment likely implied a deterioration of wages and earnings.

Table 9 shows the impact of import exposure on the type of labor contract or some other labor arrangements that the worker was subject to. Column 1 shows an increase in the probability of transitioning to a "fixed-term contract", namely an arrangement with a specific end date, implying a more precarious situation and often lower remuneration than a standard labor contract. The usual quantification implies that workers in a sector at the 75th percentile of the distribution of import penetration had a 1.3 p.p. higher probability of transitioning to a fixed-term employee than a worker in a sector at the 25th percentile. Workers in more exposed sectors are also more likely to move into part-time contracts. The estimated coefficient - to a 0.8 p.p. difference when comparing workers in P75 and P25 - is non-significant at the usual confidence values.

The third column of Table 9 shows that workers in more exposed sectors face a significantly higher risk of being for at least one week in a short-term work compensation program (Cassa Integrazione Guadagni, or CIG), which consists of a temporary interruption of their job without losing employment status (a kind of temporarily subsidized employment status). Columns 4 and 5, however, do not show evidence of a higher risk of spending at least a week without receiving labor income nor evidence of a higher probability of spending a whole year in unemployment for those working in sectors more exposed to the China shock emerges. The combined picture emerging is of a higher probability of workers in exposed sectors transitioning across sectors, out of manufacturing, or into subsidized or less stable labor contract arrangements in the 2001-2016 period. Overall, this penalized their earnings but did not increase unemployment or non-activity or reduce weeks worked. The presence of those potential margins of adjustment, on the one hand, allowing some flexibility, on the other hand, supported by the government, engendered a limited effect on the employment of incumbents in sectors heavily impacted by the increased import competition.

5.3 Heterogeneity analyses

In this section, we separate the effect of import penetration on workers based on their initial characteristics or firm location. In particular, as we have found stronger negative effects of import penetration on large firms, we analyze the impact on workers, depending on the size of the firm where they were employed in 2001. We separate small (less than 16 employees) from large firms. We then also characterize whether the shock affected skilled and unskilled workers differently. We capture this by separating workers by broad occupation (blue collar, white collar, and managers) in 2001 or by their tercile in the wage distribution in 2001.

Table 10 shows the heterogeneity of effects of import penetration on the propensity of workers to remain longer in the same firm (column 1), sector (column 2), in manufacturing (column 3), or in private employment (column 4). Additionally, Table 10 shows in columns 5 and 6 the impact on weeks worked and earnings. Consistently with results for firms reported in Table 6 of Section 5.1, we find that workers in larger firms were less likely to remain in the same sector, in manufacturing or in the private sector. Among those initially working in large firms, one standard deviation higher exposition to import competition reduces the

years spent in manufacturing by 0.8 percent of a year and in private employment by a similar amount. No significant effect is found for those initially employed in smaller firms. The negative effect on earnings is much larger among those initially working in large firms. Comparing workers in sectors at the 75th and 25th percentile of the distribution of our measure of import penetration, the differences in yearly earnings between those who started in large vs. small firms were -0.49% and -0.29%, respectively. The import competition-related loss was almost twice as large for workers starting in 2001 in large manufacturing firms. Similarly, workers initially in large firms were more likely to move to services, out of manufacturing, and within manufacturing sectors than those starting in small firms. When examining differences in impact across workers' skills, Table 10 shows that medium-high skilled workers (white collar and manager, and those in the middle and high wage tercile as of 2001) experienced a larger propensity to leave the sector, and private employment earlier and larger losses of earnings.

Symmetrically, Table 11 shows that the probability of transitioning to a different sector, out of manufacturing and to services in response to the shock is larger for workers who were in large firms (in 2001) and for white collars and managers and those in the top 2 terciles of wage distribution. Similarly, Table 12 shows a higher propensity of the same groups of workers starting in large firms and more skilled to experience downgrades to fixed-term, part-time contracts and the use of the publicly subsidized employment option (CIG). Larger firms usually pay higher wages and provide more stable career patterns and longer tenure. Hence, the larger instability caused by import competition in those sectors was damaging employees who had experienced, up to that point, better wages and better employment outcomes. Overall, while there is no evidence of a reduction in weeks worked by manufacturing workers in response to the shock, the increased propensity to change sector, move out of manufacturing, and be 'downgraded' to more unstable labor contract arrangements was pervasive. Moreover, such adjustments seem to happen particularly for those employed in large firms and often for those with higher skills and initial wages.

Hence, on the one hand, the import competition shock produced long-term earnings inequality between workers more or less exposed to this shock. On the other hand, by affecting more intensive workers with higher skills and working in large firms, the shock reduced earnings inequality between incumbent workers. These findings confirm that multiple and complex adjustment mechanisms were at work in response to an extensive shock related to the increase in Chinese imports.

6 Conclusions

In drawing some conclusions, it is useful to summarize our results and compare their similarities and differences with those of other studies on the effect of entry of China into the WTO and the subsequent increased import competition on the wage and employment outcomes of advanced economies' workers. The effects found in Autor et al. (2014) for US workers and by De Lyon and Pessoa (2021) for the UK, both obtained by analyzing the early 2000s, consist in a much more substantial reduction in the yearly earnings (between 2 and 3 percent for a move from the 25th to the 75th percentile of import competition) as well as a drop in employment for workers over the decade. Our (significant) effect on earnings is much smaller (-0.34%), and we do not find any significant effect on employment. Common to our and their studies is the finding of an increase in the probability of leaving the sector and leaving manufacturing for an array of other options (in the US, disability was an important

outcome; in our case, services and self-employment are more important options). The US and UK labor markets are more flexible than Italian ones, and the lay-off restrictions are smaller. Hence, the protection for affected workers may have been more limited, which may explain the larger effects on wages and the dropping out of employment, which, in Italy, we do not observe.

Studies of effects in European countries, such as those quoted in Dorn and Levell (2021), have found more limited effects of the import competition shocks on employment than the US ones. Similarly to studies in the US, they cover the 2000s and emphasize how Europe was less exposed to the Import competition effect of China in that period. As the European impact from Chinese imports was delayed to the 2000s, this emphasizes the importance of extending the analysis to the 2001-2016 period as we do. Relative to Citino and Linarello (2022), who do not find significant effects on earnings and employment, we show that considering a longer period, up to 2016 (rather than only up to 2007 as they do), is very important to find negative earnings impact. As import competition shocks take some time to produce their effects, especially in the presence of some governmental support to employment and earnings, our longer horizon analysis adds important insight.

One common finding of several papers analyzing the US and European economies is that they usually find stronger negative earnings and employment effects for less skilled workers in more vulnerable firms. A partial exception is Dauth et al. (2014), which analyzes the German case. They find a stronger wage effect of import competition on less skilled workers and stronger effects for workers initially in more productive firms. Our finding of stronger effects for people initially more skilled and working in larger firms is relatively new. The explanation for such a finding is likely that, in Italy, the government policies in support of employment in manufacturing (e.g., through the short-term work compensation allowance, CIG) combined with those in support of firms smaller than 16 workers, such as lower taxation and fewer labor markets' regulation, implied a muted response of employment and earnings, and those effects were smaller for low skilled workers and those in small firms. Such different distribution of the shock's effects implies that, in Italy, not only the impact of import competition on manufacturing employment and wages was attenuated, but that the shock worked to reduce, rather than increase, the inequality between workers of large and small firms and between more versus less skilled workers. These differences suggest that the institutional and local context matter in explaining the details of the impact of import competition on manufacturing workers of advanced economies.

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Table 1: Firms' characteristics of all firms in 2001 and of those surviving in 2016.

	Firms in 2001		**Survivor Firms in 2016**	
	Mean	S.D.	Mean	S.D.
Number of employees	14.6	101.4	19.1	148.0
Total wage bill	385,203	3,229,296	530,053	4,665,809
Mean wage	16,294	17,571	17,423	9,751
Mean worked weeks	41.7	10.0	42.7	8.8
Share of blue-collars	0.836		0.821	
	Obs.	%	Obs.	%
Age				
<10	129,008	0.472	39,766	0.412
>=10	144,231	0.528	56,753	0.588
Geographical area of work				
North	163,564	0.599	64,378	0.667
Centre	53,600	0.196	16,794	0.174
South	56,075	0.205	15,347	0.159
Size				
Small (15 or less employees)	225,309	0.825	75,188	0.779
Large (more than 15 employees)	47,930	0.175	21,331	0.221
Total obs	273,239		96,519	

Notes: our calculations on the INPS dataset on firms, using the unweighted sample.

Table 2: Workers' composition in 2001

Gender	Values	%
Male	2,681,243	0.684
Female	1,238,995	0.316
Geographical area of work		
North	2,703,934	0.690
Centre	642,536	0.164
South	573,334	0.146
Broad occupation		
Manager	76,648	0.020
White-collar	944,538	0.241
Blue-collar	2,899,052	0.740
labor market experience (in years)		
<5	804,969	0.205
5-15	1,301,849	0.332
>15	1,813,420	0.463
Tenure in the firm (in years)		
<2	1,164,858	0.297
2-5	1,006,889	0.257
>5	1,748,491	0.446
Firm size		
Small (15 or less employees)	1,383,783	0.353
Large (more than 15 employees)	2,536,455	0.647
Total obs	3,920,238	

Table 3: Outcomes for survivor firms' and workers' in 2001-2016.

	Mean	S.D.
Survivor firms		
Wage bill	1.110	0.551
Number of employees	1.030	0.469
Share of blue-collar employees	0.915	0.185
Workers		
Years in the same 2001 firm	8.69	5.79
Years in the 2001 sector	10.43	5.64
Years in manufacturing	12.30	4.91
Years in private employment	13.79	3.84
Yearly worked weeks	43.25	14.90
Mean Earnings/2001 earnings	0.968	0.210
Mobility to a different firm	0.463	0.499
Mobility to services	0.373	0.484
Mobility out of manufacturing	0.427	0.495
Mobility within manufacturing	0.271	0.445
Mobility across regions	0.093	0.291
Mobility to a fixed-term contract	0.332	0.471
Mobility to a part-time contract	0.268	0.443
Risk of receiving the CIG allowance	0.185	0.389
Risk of spending a week with zero earnings or allowances	0.544	0.498
Risk of spending a year not working	0.208	0.406

Notes: Firms weighted by the number of employees in 2001. Outcomes for survivors firms are computed as the cumulated values divided by the 15 years considered and the value recorded in the year 2001.

Table 4: Pre-trend tests

	Number of workers		Number of firms		Number of workers per firms	
	1991-1981	2001-1991	1991-1981	2001-1991	1991-1981	2001-1991
Coeff.	0.7351	0.4149	2.1957	3.5317	-19.2727	26.8171
St.dev	(0.9388)	(0.9028)	(5.0996)	(7.9854)	(80.7555)	(75.5874)
Adj. R-Sq.	-0.0045	-0.0089	-0.0096	-0.0091	-0.0111	-0.0099
N. of Obs.	87	90	87	90	87	90

Table 5: Effects of exposure to import from China on firms' survival, employment and wages. IV estimates

	All firms		**Only survived firms**		
	Survival rate		Wage bill	Number of employees	Share of blue-collar employees
	2001-2007	2001-2016	2001-2016	2001-2016	2001-2016
ΔIP from CHN per worker	-0.0014	-0.0184*	-0.0321**	-0.0282**	-0.0202***
	(0.0068)	(0.0099)	(0.0140)	(0.0117)	(0.0066)
Observations	271,609	271,609	92,292	92,292	89,950
R-squared	0.0738	0.0988	0.1618	0.1594	0.1178
First st. F-stat	5.64	19.56	18.70	18.70	17.71

Notes: Firms weighted by the number of employees in 2001. The share of blue-collar employees variable is undefined for 2,342 firms where no blue-collar workers are employed.
Robust standard errors in parenthesis; $***p < 0.01, **p < 0.05, *p < 0.10$

Table 6: Effects of exposure to import from China on firms' survival, employment, and wages for firms with at most or more than 15 employees. IV estimates

	Heterogeneity by firm's size							
	Survival in 2001-2016		Wage bill		Number of employees		Share of blue-collars	
	<16	>=16	<16	>=16	<16	>=16	<16	>=16
ΔIP from CHN per worker	-0.0163**	-0.0195*	0.0080	-0.0452**	0.0011	-0.0372**	-0.0089**	-0.0217***
	(0.0075)	(0.0109)	(0.0069)	(0.017)	(0.0061)	(0.014)	(0.0037)	(0.0068)
Observations	223,993	47,616	72,557	19,732	72,560	19,732	70,473	19,477
R-squared	0.0665	0.1086	0.1793	0.1791	0.1867	0.1787	0.0621	0.1463
First st. F-stat	25.40	21.39	22.79	18.96	22.79	18.96	23.36	17.84

Notes: Firms weighted by the number of employees in 2001. Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 7: Yearly effects of exposure to China import on workers' total outcomes in 2001-2016. IV estimates

	Years in the same 2001 firm	Years in the 2001 sector	Years in manufacturing	Years in private employment	Working weeks	Earnings
ΔIP from CHN per worker	-0.0058	-0.0238***	-0.0050	-0.0042*	0.1461	-0.0049**
	(0.0054)	(0.0084)	(0.0042)	(0.0024)	(0.1168)	(0.0022)
Observations	3,888,546	3,888,546	3,888,546	3,888,546	3,888,546	3,888,546
R-squared	0.2094	0.1963	0.1690	0.1159	0.3317	0.3184
First st. F-stat	20.90	20.90	20.90	20.90	20.90	20.90

Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 8: Effects of exposure to China import on workers' career mobility. IV estimates

	Mobility to a different firm	Mobility out of manufacturing	Mobility within manufacturing	Mobility to services	Mobility across regions
ΔIP from CHN per worker	0.0057	0.0173*	0.0443***	0.0196**	0.0110
	(0.0070)	(0.0091)	(0.0155)	(0.0096)	(0.0096)
Observations	3,888,546	3,888,546	3,888,546	3,888,546	3,888,546
R-squared	0.0939	0.1130	0.0830	0.0974	0.0612
First st. F-stat	20.90	20.90	20.90	20.90	20.90

Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 9: Effects of exposure to China import on workers' employment risks. IV estimates

	Mobility to fixed-term contract	Mobility to part-time contract	CIG risk	Zero income risk	Unemployment risk
ΔIP from CHN per worker	0.0165**	0.0102	0.0138*	-0.0010	-0.0061
	(0.0082)	(0.0065)	(0.0077)	(0.0041)	(0.0043)
Observations	3,888,546	3,888,546	3,888,546	3,888,546	3,888,546
R-squared	0.1317	0.1473	0.1019	0.2525	0.1461
First st. F-stat	20.90	20.90	20.90	20.90	20.90

Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 10: Yearly effects of exposure to China import on workers' total outcomes in 2001-2016. Heterogeneity by firm size type of occupation and wage terciles in 2001. IV estimates.

	Years in the same 2001 firm	Years in the 2001 sector	Years in manufacturing	Years in private employment	Working weeks	Earnings
			Heterogeneity by firm size in 2001			
Small	-0.0007	-0.0211***	-0.0031	0.0001	0.1796	-0.0037*
	(0.0038)	(0.0064)	(0.0045)	(0.0022)	(0.1855)	(0.0019)
Large	-0.0114	-0.0277***	-0.0088**	-0.0085**	-0.0178	-0.0063***
	(0.0071)	(0.0086)	(0.0044)	(0.0034)	(0.0682)	(0.0023)
			Heterogeneity by occupation in 2001			
Blue-collar	-0.0029	-0.0218**	-0.0043	-0.0029	0.2119	-0.0043**
	(0.0038)	(0.0086)	(0.0045)	(0.0021)	(0.1436)	(0.0021)
White-collar	-0.0087	-0.0257***	-0.0047	-0.0051*	0.1236	-0.0055**
	(0.0089)	(0.0090)	(0.0056)	(0.0031)	(0.0936)	(0.0022)
Manager	-0.0082	-0.0254***	-0.0058	-0.0071**	-0.0325	-0.0080***
	(0.0116)	(0.0088)	(0.0092)	(0.0030)	(0.1237)	(0.0019)
			Heterogeneity by wage tercile in 2001			
Low	-0.0047	-0.0167**	-0.0009	-0.0007	0.2889	-0.0028**
	(0.0031)	(0.0069)	(0.0047)	(0.0019)	(0.2098)	(0.0014)
Middle	-0.0099*	-0.0276***	-0.0083	-0.0050	0.0977	-0.0042*
	(0.0058)	(0.0100)	(0.0054)	(0.0035)	(0.0827)	(0.0023)
High	-0.0045	-0.0270***	-0.0083*	-0.0081**	-0.0098	-0.0053***
	(0.0083)	(0.0088)	(0.0044)	(0.0034)	(0.0630)	(0.0018)

Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 11: Effects of exposure to China import on workers' career mobility. Heterogeneity by firm size type of occupation and wage terciles in 2001. IV estimates.

	Mobility to a different firm	Mobility within manufacturing	Mobility out of manufacturing	Mobility to services	Mobility across regions
Heterogeneity by firm size in 2001					
Small	-0.0026	0.0366***	0.0116	0.0157	0.0036
	(0.0078)	(0.0139)	(0.0082)	(0.0097)	(0.0029)
Large	0.0095	0.0464***	0.0237***	0.0240***	0.0113
	(0.0086)	(0.0140)	(0.0090)	(0.0093)	(0.0111)
Heterogeneity by occupation in 2001					
Blue-collar	0.0026	0.0397***	0.0155	0.0177*	0.0057
	(0.0059)	(0.0146)	(0.0098)	(0.0101)	(0.0069)
White-collar	0.0079	0.0510***	0.0187*	0.0219**	0.0155
	(0.0124)	(0.0153)	(0.0105)	(0.0105)	(0.0114)
Manager	0.0010	0.0489**	0.0241**	0.0243**	0.0044
	(0.0214)	(0.0191)	(0.0117)	(0.0113)	(0.0106)
Heterogeneity by wage tercile in 2001					
Low	0.0070	0.0377**	0.0094	0.0130	0.0083
	(0.0063)	(0.0153)	(0.0083)	(0.0091)	(0.0074)
Middle	0.0095	0.0460***	0.0183*	0.0216**	0.0127
	(0.0060)	(0.0156)	(0.0105)	(0.0110)	(0.0095)
High	-0.0013	0.0443***	0.0242***	0.0244***	0.0042
	(0.0115)	(0.0139)	(0.0090)	(0.0089)	(0.0095)

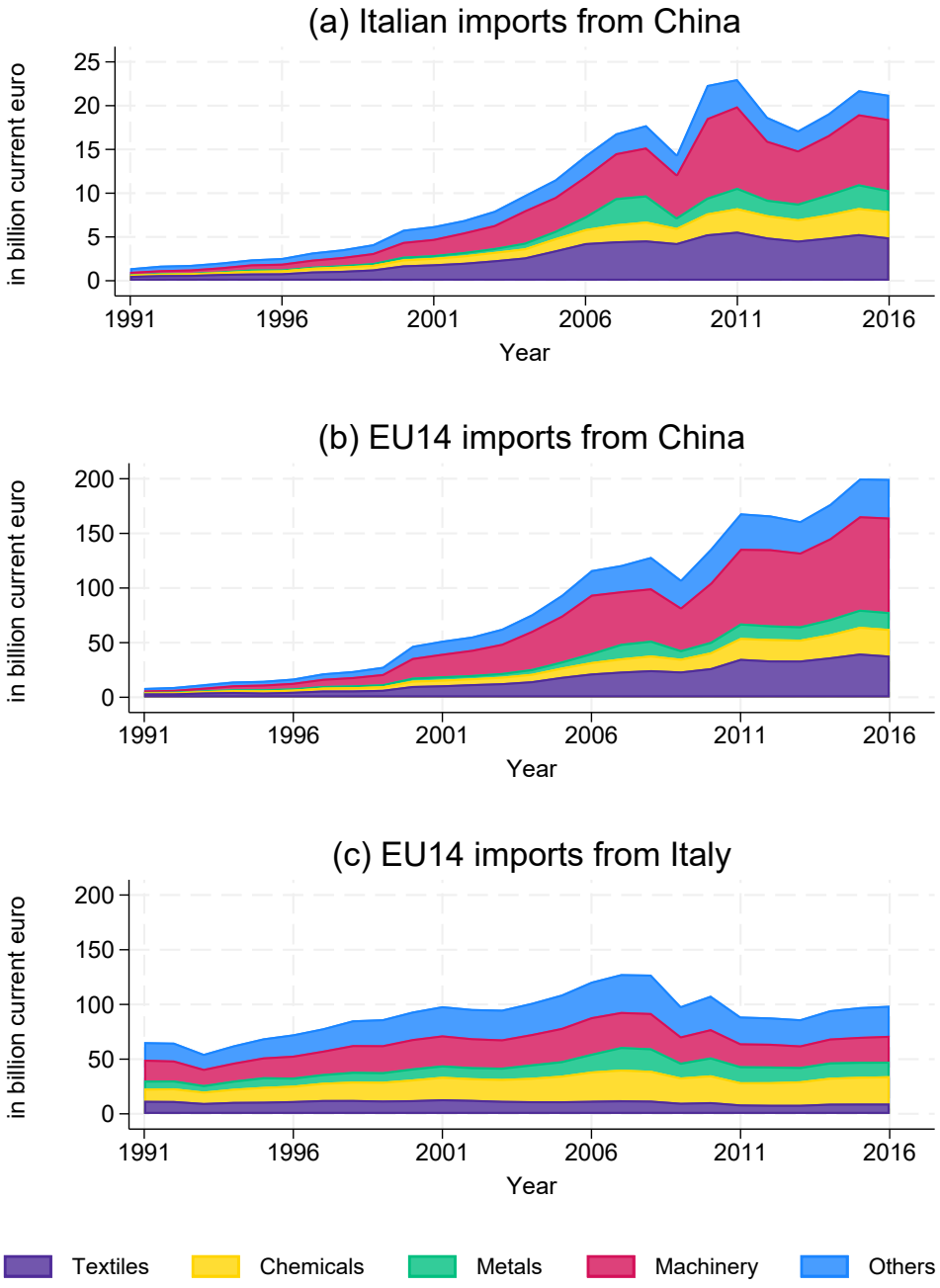
Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Table 12: Effects of exposition to China import on workers' employment risks. Heterogeneity by firm size type of occupation and wage terciles in 2001. IV estimates.

	Mobility to fixed-term contract	Mobility to part-time contract	CIG risk	Zero income risk	Unemployment risk
Heterogeneity by firm size in 2001					
Small	0.0101	-0.0014	0.0102	-0.0034	-0.0057
	(0.0062)	(0.0054)	(0.0073)	(0.0056)	(0.0056)
Large	0.0215**	0.0192***	0.0138*	0.0045	-0.0021
	(0.0085)	(0.0074)	(0.0073)	(0.0042)	(0.0025)
Heterogeneity by occupation in 2001					
Blue-collar	0.0161*	0.0092	0.0146	-0.0009	-0.0073
	(0.0091)	(0.0070)	(0.0090)	(0.0043)	(0.0058)
White-collar	0.0176**	0.0158**	0.0092**	-0.0012	-0.0053**
	(0.0081)	(0.0068)	(0.0043)	(0.0044)	(0.0022)
Manager	0.0254***	0.0260***	0.0148***	0.0031	0.0002
	(0.0053)	(0.0048)	(0.0035)	(0.0061)	(0.0030)
Heterogeneity by wage tercile in 2001					
Low	0.0094	0.0019	0.0094	-0.0061	-0.0083
	(0.0070)	(0.0050)	(0.0071)	(0.0043)	(0.0072)
Middle	0.0189*	0.0099	0.0109	-0.0019	-0.0037
	(0.0098)	(0.0078)	(0.0101)	(0.0042)	(0.0025)
High	0.0207**	0.0183**	0.0154**	0.0034	-0.0026**
	(0.0083)	(0.0075)	(0.0062)	(0.0047)	(0.0013)

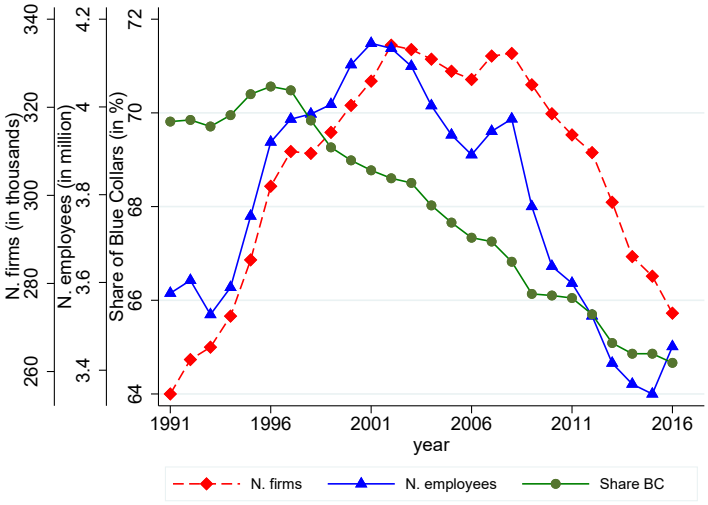
Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.10

Figure 1: Import penetration over the period 1991-2016



Notes: "Textiles" include textiles, wearing apparel, tanning and dressing of leather, luggage, etc..; "Chemicals" include coke, refined petroleum, chemicals, rubber, plastic, non-metallic mineral; "Metals" include basic metals and fabricated metal; "Machinery" include machinery, office machinery, computers, electrical machinery, radio, television, medical, precision, optical instruments; "Others" include food products and beverages, wood, pulp, paper, publishing, printing, motor vehicles, other transport equipment, furniture.

Figure 2: Number of firms, number of employees, and share of blue-collar workers in Italy



A Appendix

Figure A.1: Effect of changing IP from CHN on the share of blue-collars employees, IV estimates (all firms – left panel; balanced sample – right panel)

Figure A.2: Effect of changing IP from CHN on the number of employees (all firms – left panel; balanced sample – right panel)

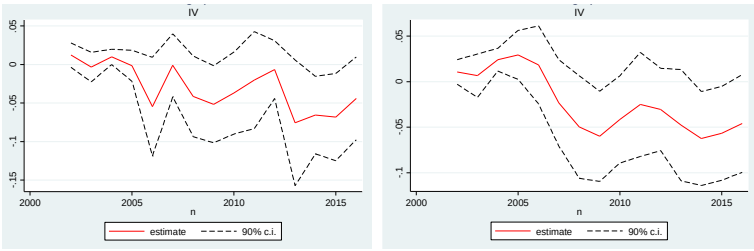


Figure A.3: Effect of changing IP from CHN on year by year mobility within manufacturing

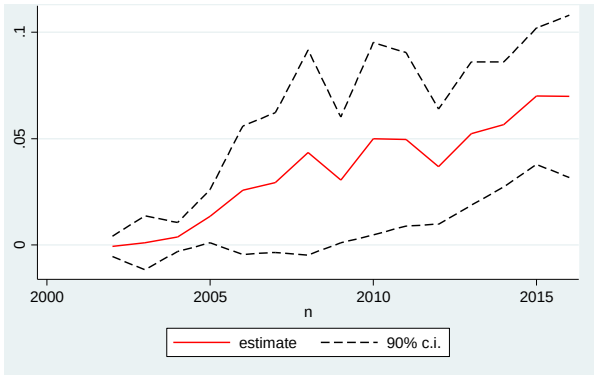


Table A.1: Definitions of the dependent variables used in the firm level- and individual-level analyses

Firm level analysis

Variable	*Content*
Survival	Dummy equal to 1 when the firm is active over the observed period, 0 if it closes
Wage bill	Sum of firm's yearly wage bill from 2002 to 2016, normalised wrt the 2001 value
Number of employees	Sum of firm's yearly average number of employees from 2002 to 2016, normalised wrt the 2001 value
Share of blue-collars	Sum of the firm's yearly share of blue-collar workers from 2002 to 2016 period, normalised wrt the 2001 value

Individual level analysis

Variable	*Content*
Years in the 2001 industry	Number of years from 2002 to 2016 spent in the 2001 3-digit Nace industry, normalised wrt the number of years in activity from 2002 to 2016
Years in private employment	Number of years from 2002 to 2016 spent working as an employee in the private sector, normalized wrt the number of years in activity from 2002 to 2016
Working weeks	Total number of worked weeks from 2002 to 2016, normalized wrt the number of years in activity from 2002 to 2016
Weeks with the CIG allowance	Total number of worked weeks spent receiving the CIG allowance from 2002 to 2016, normalized wrt the number of years in activity from 2002 to 2016
Earnings	Total annual gross earnings received from 2002 to 2016, normalized wrt 2001 earnings and wrt the number of years with positive earnings from 2002 to 2016
Mobility to a different firm	Dummy equal to 1 when the worker moves at least once from 2002 to 2016 to a firm different from that where she was employed in 2001, 0 otherwise
Mobility to services	Dummy equal to 1 when the worker moves at least once from 2002 to 2016 to the service sector, 0 otherwise
Mobility out of manufacturing	Dummy equal to 1 when the worker moves at least once from 2002 to 2016 to the service sector or to public employment or to self-employment, 0 otherwise
Mobility within manufacturing	Dummy equal to 1 when the worker moves at least once from 2002 to 2016 to a manufacturing 3-digit Nace industry different from that where she was employed in 2001, 0 otherwise
Mobility across regions	Dummy equal to 1 when the worker moves at least once from 2002 to 2016 to a region of work different from that where she was employed in 2001, 0 otherwise
Mobility to fixed-term contract	Dummy equal to 1 when the worker moves to a fixed-term arrangement at least once from 2002 to 2016, 0 otherwise
Mobility to part-time contract	Dummy equal to 1 when the worker moves to a part-time arrangement at least once from 2002 to 2016, 0 otherwise
CIG risk	Dummy equal to 1 when the worker spent at least 1 week from 2002 to 2016 receiving the CIG allowance, 0 otherwise
Zero income risk	Dummy equal to 1 when the worker spent at least 1 week from 2002 to 2016 without labor income or allowances, 0 otherwise
Unemployment risk	Dummy equal to 1 when the worker spent not working at least 1 year from 2002 to 2016, 0 otherwise

Table A.2: Definition of control variables used in the firm level- and individual-level analyses

Firm level analysis

Variable	*Content*
Firms' characteristics in 2001	Age (2nd-degree polynomial); size (3rd-degree polynomial); type (single, leader or follower in a holding)
Employment composition in 2001	Share of employees by gender; by age class (<30, 30-49, 50-64); by citizenship (Italian, EU, extra-EU); by occupation (blue-collar, white-collar, manager); by years of tenure in the firm (0-5, 6-10, over 10). Share of part-time employees; share of fixed-term employees. Mean experience in manufacturing (in weeks); mean experience in employment (in weeks)
Employees outcomes in 2001	Mean annual wages; mean worked weeks
Import penetration	Import penetration from China in 2001; import penetration from EEU countries in 2001; change of import penetration from EEU countries from 2001 (all considered at the 3-digit Nace industry level and normalized wrt the 1991 employment)
Fixed effects and pre-trend	Province fixed effects; change in 3-digit industry number of employees from 1981 to 1991

Individual level analysis

Variable	*Content*
Workers' demographic characteristics in 2001	Gender; dummies on citizenship (Italian, EU, extra-EU); 2nd degree polynomial on age
Workers' employment characteristics in 2001	Dummies on full-time vs part-time contract; dummies on open-ended vs fixed-term contract; 2nd degree polynomial on total work experience and experience in the 3-digit Nace industry (all in weeks) and on the tenure in the firm (in years); log annual earnings; number of worked weeks; number of weeks spent receiving the CIG allowance; number of weeks spent without labor income or allowance
Activity status	Number of years in activity from 2002 to 2016 (i.e. excluding years from retirement)
Firms' characteristics in 2001	Size (3rd-degree polynomial); type (single, leader or follower in a holding)
Import penetration	Import penetration from China in 2001; import penetration from EEU countries in 2001; change of import penetration from EEU countries from 2001 (all considered at the 3-digit Nace industry level and normalized wrt the 1991 employment)
Fixed effects and pre-trend	Province of work fixed effects; change in 3-digit industry number of employees from 1981 to 1991