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Services trade and labor market outcomes: Evidence from Italian firms

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Abstract

This paper empirically investigates the effects of services imports and exports on firm employment. We use micro-data on Italian firms for the period 2009–2017. Applying a shift-share instrumental variable approach, we show that services imports and exports have a positive impact on total employment. This finding holds for managers, white-collar workers, and blue-collar workers. We also show that services exports are particularly effective in increasing employment of "servitized" manufacturing firms as well as of companies that are deeply integrated into international services markets. Overall, this paper suggests that firm employment might largely benefit from the services trade dimension of globalization.

KEYWORDS

employment, firm-level data, Italy, services trade

1 | INTRODUCTION

Over the last few decades, the process of globalization has been characterized by the increasing role of services in international trade. The total value of cross-border services transactions amounted to 3.7 trillion US Dollars in 2017 (WTO, 2019). Counting other modes of services trade provision, including through a commercial presence in the importing country, the figure rises to 13.3 trillion US Dollars. In general, world trade in services has been growing faster than trade in goods (WTO, 2019). Internationally traded services are also increasingly used in production processes and embedded in production outputs, responding to technological progress and to

firms' strategies to compete in domestic and international markets (see, e.g. Ariu et al., 2019a; Berlingieri, 2015; Francois & Reinert, 1996; Francois & Woerz, 2008; Hoekman & Shepherd, 2017).

Against this backdrop, the study of the effects of services trade on firms and workers has recently attracted growing interest from scholars in the fields of international and labor economics as well as from international organizations, with a special focus on the role of services imports (see, e.g. Crinò, 2010; Eppinger, 2019; Lassmann, 2020; Liu & Trefler, 2019). This paper contributes to this literature by empirically investigating the effect of both services imports and exports on employment in a broad population of Italian firms over the period from 2009 to 2017. Italy represents a relevant case study because of the increasing pattern in services trade over the recent years for which detailed firm-level data on services trade are available. Italy is an advanced economy in which the growth rate of trade in the services is similar to that of other OECD countries: the compound growth rate of services exports (imports) between 2009 and 2017 was 4.1% (3.4%) in Italy and 4.3% (3.7%) in the other OECD countries.[1.] Moreover, Italian firms have not yet fully exploited the potential growth in services trade due to existing barriers to services trade. Indeed, according to the 2020 OECD Services Trade Restrictiveness Index (OECD, 2021), policy restrictions to services imports in Italy are higher than in the average OECD economy. By focusing on the Italian case, our paper broadens the geographic scope of the existing body of research and provides relevant insights for any policy action targeting the increase of services trade by Italian firms.

In this paper, we go beyond the standard focus on services imports and we provide a joint assessment of the employment effect of services imports and exports. Taking into account both sides of services, trade is important to gain an overall understanding of the effects of the services trade dimension of globalization on firm labor outcomes. Moreover, this allows us to identify those firms that are engaged systematically in both services imports and exports. We call these firms "importers–exporters" and we consider them as a model of high integration into international services markets which they use both as a source of intermediate inputs and as a destination for output. Our analysis tests whether the linkages between services trade performance and employment outcomes are different in importers–exporters with respect to firms that tend to be engaged only in one direction of services trade.

Our analysis uses detailed information on bilateral services trade transactions in the years 2009–2017 for a sample of Italian firms, sourced from a survey dataset designed to capture a large fraction of services trade in Italy. These data are combined with detailed firm-level employment information measuring not only total employment, but also the number of managers, white-collar workers, and blue-collar workers. We use this microdata to investigate the firm-level employment effects of simultaneous changes in the volume of services imports and services exports. The main analysis instruments for imports and exports using firm-specific export supply shocks and import demand shocks by partner countries and services types. This is a classic shift-share instrumental variable approach similar to Hummels et al. (2014), who analyze offshoring of manufactured inputs by Danish firms. This identification strategy relies on firms' importing and exporting behavior being highly firm specific and stable over time. An Italian firm, which initially imports and exports a given service from a given country, benefits disproportionately from an improvement in the country's comparative advantage in this particular service. The crucial assumption is that foreign countries' imports from and exports to the rest of the world are uncorrelated with employment levels in Italian firms, except through trade in services.

By estimating our preferred specifications with instrumental variables, we establish a positive and statistically significant effect of both services imports and exports on employment. The

estimated elasticity of services imports on firm employment is 4.3%; that of services exports is 2.9%. These effects are sizeable and they are in line with other works that use microdata from different advanced economies. These results hold across all occupational categories identified in our data (managers, white collars, and blue collars).

Moreover, our empirical analysis makes three additional findings. First, we show that services exports are particularly effective in raising employment for those firms whose main sectoral affiliation lies outside the services sectors. This suggests that "servitization"—the practice of performing and exporting services alongside manufacturing output and exports—spurs employment of all occupational categories. Second, we find that services exports boost employment mainly of importers–exporters. On the contrary, services imports have a strong positive employment effect in firms engaged only in one direction of services trade. This suggests that services exports play a stronger role in raising employment at a higher level of integration into international services markets while services imports raise employment levels when firms are not systematically active in both services import and export markets. Finally, the positive effect of both services imports and exports on managers and white collars does not seem to be affected by the quality of economic institutions in the area where firms are located. Overall, our results portrait a rather positive scenario for Italian workers in a process of globalization where firms become more integrated in international services markets.

The remaining of the paper is structured as follows. Section 2 reviews the existing body of research on services trade and employment discussing the main theoretical mechanisms and empirical results in the literature. Section 3 introduces and describes the data. Section 4 presents the identification strategy used in the econometric exercises and Section 5 discusses estimation results. Section 6 concludes.

2 | THEORY AND EVIDENCE ON THE SERVICES TRADE- EMPLOYMENT LINKAGES

It is well established that a firm's trade performance can have a significant impact on its employment level. This is the case across import and export transactions as well as for both trade in goods and services. In this section, we focus on the linkages between services trade and employment, reviewing the theoretical mechanisms and the existing empirical evidence on the effects of services trade on employment variables. We highlight those mechanisms and results where services reveal different properties as compared to goods. Our discussion here serves the purpose of informing and positioning our empirical investigation of the impact of services trade performance on firm employment level.

Let us start by looking at the import side. On the one hand, sourcing intermediate inputs from international markets can increase the profitability (Halpern et al., 2015) as well as the physical productivity of the firm.[2.] These changes might have a positive effect on employment in so far as they imply a larger (expected) output for the firm. This mechanism is usually referred to in the literature as the "scale effect." On the other hand, if the imported inputs substitute for intermediates that were produced or performed using in-house labor, the firm's employment demand might shrink. This second mechanism is called "substitution effect". Ultimately, the net effect of higher imports on the level of employment is theoretically ambiguous (Arndt, 1997, 1998; Egger & Falkinger, 2003; Grossman & Rossi-Hansberg, 2008; Jones & Kierzkowski, 1990; Kohler, 2004a, 2004b).

Existing empirical works on services trade and labor market outcomes have focused mainly on the role of services imports or services offshoring. These studies ground their empirical investigation on the theoretical mechanisms discussed here and aim at estimating which one between the scale and the substitution effect prevails in a variety of empirical settings (Amiti & Wei, 2005; Hertveldt & Michel, 2013; Milberg & Winkler, 2010b, 2010a; Winkler, 2010;). Consistently with the underpinning theoretical ambiguity, the results of analyses at the sectoral level are mixed. Amiti and Wei (2005) find a positive correlation between services offshoring and employment in the UK between 1995 and 2001. Focusing on US sector-level data, Amiti and Wei (2006) identify a negative effect of services offshoring on employment. This negative impact vanishes if a less disaggregated sector classification is used, suggesting that there is sufficient growth in labor demand in sub-sectors within these broader categories to offset the negative effect. In the case of Germany and Belgium, respectively, Schöller (2007); Winkler (2010) and Hertveldt and Michel (2013) find a negative impact of services offshoring on low-skilled labor in manufacturing sectors. Milberg and Winkler (2010a, (2015) extend this analysis to OECD countries and show that negative impacts are attenuated by the existence of labor market institutions that reduce economic insecurity.[3.] However, related empirical country case studies analyzing firm- and/or worker-level data tend to point to the existence of a systematic positive impact of services imports on downstream employment, in particular on high skill labor. These works include Crinò (2010); Liu and Trefler (2019) for the US case; Michel and Rycx (2012) for Belgium; Andersson et al. (2016); Nordås et al. (2019) for Sweden; Eppinger (2019) for Germany; Ariu et al. (2019b) for Finland; Lassmann and Spinelli (2020) for the UK; and Jaax et al. (2020) for Vietnam.

Things are simpler on the export front: other things being equal, more international sales would potentially lead firms to create new jobs to support their expansion in foreign markets. At the industry level defined within local labor markets, the positive relationship between exports performance and employment is identified in a number of recent studies including Dauth et al. (2014); Feenstra et al. (2019). This mechanism should in principle not be affected by the nature of the export transaction, whether it is about services or goods. However, one aspect that reinforces this impact channel and that is specific to services is the property of services exports to boost the exports of manufacturing goods. Theoretically, services exports by manufacturing firms are part of the process of "servitization" (Kelle, 2013; Vandermerwe & Rada, 1988), that is non-services firms including services in their domestic sales and exports, typically in association with a good. This might trigger higher demand for goods exports from the same firm, which can use services as a lever to diversify its output with respect to competitors on the international markets. Consistently with this, Ariu et al. (2020) find evidence of the positive role of services exports to increase exports of goods, demand opportunities, and market power in Belgian firms. Therefore, higher services exports might have a positive impact on employment in manufacturing firms/sectors also through their effect on goods exports.

The empirical evidence on the effect of services export performance on employment outcomes is quite limited. One exception is the study by Nordås et al. (2019) where the authors use Swedish microdata on firms and individual workers and show that services exports (as well as imports) stimulate labor demand, in particular of skilled workers. A similar result is obtained by Lassmann and Spinelli (2020) for the UK while Liu and Trefler (2019) show that within the US labor market service exports have partially offset the negative effects of higher services imports from China and India.

Overall, this body of research identifies theoretical linkages from services trade to employment and shows their existence in a number of empirical settings including firm- or worker-level country case studies (see Lassmann, 2020, for a recent synthesis paper on this particular level of

analysis), cross-country frameworks with sector-level data as well as local market analyses (see for instance Magli, 2020. Services imports or offshoring is found to have a positive impact on employment levels in many but not all of these settings, reflecting the opposite signs of the "scale" and the "substitution effect" identified by the theory. On the contrary, from the handful of studies looking at the effect of services exports, it emerges a systematic positive effect on employment. The empirical analysis that follows contributes to this literature by adding evidence on these linkages for the Italian case which has received only limited attention so far.

3 | MICRODATA AND DESCRIPTIVE EVIDENCE

The source of services trade microdata in this paper is the TTN (*Transazioni Trimestrali Non Finanziarie*, that is Quarterly Non-financial Transactions) section of the Direct Reporting (TTN-DR, henceforth) database managed by the Bank of Italy. The database includes information on exports and imports of services at the transaction level recorded in each quarter from the beginning of 2008 to the end of 2017.[4] In our analysis, we focus on the 9 years from 2009 to 2017, keeping 2008 as a pre-sample period. The transactions recorded in the data capture mostly cross-border or "mode 1" services trade and to some extent "mode 4" services trade (temporary movement of personnel). "Mode 2" (consumption abroad) and "mode 3" (commercial presence) are not covered.[5]

The TTN-DR is a survey. However, it covers the universe of firms with a yearly turnover equal or superior to Euro 165 million. According to the survey design described in Bank of Italy (2016), the database and the associated probability weights are defined to be representative of the population of Italian firms (across all sectors of the economy, excluding financial firms but including insurance) with an annual turnover above Euro 10 million. The survey design also features two strata. The first one consists of Italian firms above the 10 million turnover threshold that have executed a cross-border transaction with a foreign entity through an Italian bank. These firms are listed in the Supervisory Reports (Matrice dei Conti), a register containing detailed information of Italian banks, mainly for supervisory purposes. About 80% of sample observations are taken from this group. The second stratum consists of Italian firms above the 10 million turnover threshold and that are not listed in the above-described register. The TTN-DR is compiled with the purpose of identifying the bulk of the phenomenon of services trade as the database is used to compute the "services" values in the current account of Italy's balance of payments (Federico & Tosti, 2017). According to Bank of Italy (2016), the subset of the reference population in the TTN-DR which consists of firms above a 90 million turnover threshold for the first stratum plus the firms above a 165 million turnover threshold for the second group account for about 95% of services trade in the country. Overall, the number of firms represented by the TTN-DR database is a very small share of the universe of Italian firms as captured by other databases. However, they account for significant shares of turnover (up to 28%) and employment (up to 15%) over time. In terms of sectoral affiliation, almost 60% of the firms in our empirical population are affiliated with an industrial sector (one of the NACE two-digits sectors from 05 to 39). The remaining 40% are registered as services firms (i.e. they operate in NACE two-digits sectors from 45 to 98).[6] The fact that the phenomenon of services trade in Italy is concentrated in the subpopulation of large and very large firms is consistent with the general pattern identified in the literature studying services trade at the firm level (see, e.g. Breinlich & Criscuolo, 2011).

The TTN-DR provides a detailed classification of services (about 50 categories), which follows in part the Extended Balance of Payments Services Classification (EBOPS) 2010, within

the framework of the Balance of Payments Manual, 6th edition (BPM6). The TTN-DR does not contain trade transactions in transport or travel services: trade data on these two sectors are collected by the Bank of Italy in dedicated surveys, conducted on carriers and travelers, respectively. Following the standard approach in the literature, our baseline analysis excludes international transactions in construction services and merchanting. However, our main results are robust to the inclusion of these two sectors. We aggregate the remaining services sectors in nine categories: communication; computer and ICT services; finance and insurance; intangibles; other business services (including waste management, agricultural and mining services); personal and recreational services; professional (including professional and management consulting services, as well as architectural, engineering, and other scientific and technical services); research and development (R&D); and trade-related services.[7] Table 1 presents for each direction of services trade (reported as column dimension of the table) and for each sectoral category (listed in the row dimension): (i) the number of firms engaging in that sectoral trade throughout our sample; (ii) the sector-specific share of the relevant trade flow considering the whole sample period; and (iii) the value in million Euros for the whole sample period. In the notes to Table 1, we also report the BPM6-consistent sectors corresponding to each sectoral category.

In total, the most traded sectors in our data are other business services, finance and insurance, and professional services. Looking at the evolution of these figures over time we find that these sectoral shares are relatively stable with few exceptions. Both imports and exports of other business services progressively decrease their relative shares, going from around 30% in 2009 to less

TABLE 1 Traded services sectors

	Imports			Exports		
	Number	**% share**	**Value**	**Number**	**% share**	**Value**
Communication	1956.7	8.930	36274.4	468.0	10.81	38862.6
Computer and ICT	3894.7	7.370	29934.8	1205.2	6.207	22315.8
Finance and insurance	2770.2	16.30	66189.8	1211.5	16.78	60348.9
Intangibles	2543.9	16.73	67935.4	1132.7	12.18	43790.3
Other business	4280.4	18.17	73806.7	2650.4	21.38	76855.5
Personal & recreation	1679.8	0.592	2406.3	387.0	0.296	1064.0
Professional	4396.9	14.38	58403.2	2308.9	16.88	60678.1
R&D	1297.8	2.679	10882.5	637.3	6.266	22527.8
Trade related	4051.3	14.86	60352.7	2215.2	9.208	33107.5

Notes: The table contains for each direction of services trade (imports and exports, reported as column dimension of the table) and for each of the nine sectoral categories used in the analysis (listed in the row dimension): (i) the number of firms engaging in that sectoral trade throughout our sample (Number); (ii) the sector-specific share of the relevant trade flow considering the whole sample period (% share); and (iii) the value in million Euros for the whole sample period (Value). Computation of all measures uses the appropriate sampling weights. The BPM6-consistent sectors corresponding to each sectoral category are the following. Postal and courier services (SC4), Postal Services (SC41X), Courier Services (SC42X), Telecommunications services (SI1), Information services (SI3) in Communication; Computer services (SI2) in Computer; Insurance and pension services (SF), Financial services (SG) in Finance and Insurance; Charges for the use of intellectual property n.i.e. (SH) in Intangibles; Waste treatment and de-pollution, agricultural and mining services (SJ32), Other business services n.i.e. (SJ35) in Other business; Personal, cultural and recreational services (SK) in Personal and recreation; Professional and management consulting services (SJ2), Technical, trade-related and other business services (SJ3) in Professional; Research and development services (SJ1), Other research and development services (SJ2) in R&D; Operating leasing services (SJ33), Trade-related services (SJ34) in Trade related.

than 20% in 2017. The share of both directions of trade in professional services instead increases from 10% to almost 20% over the period under analysis. Similarly, the share of exports in R&D services raises from 5% in 2009 to almost 10% in 2017. Detailed graphical evidence on the evolution of sectoral shares over time and across both directions of services trade is given by Figure A1 in the Appendix.

Figure 1 instead plots the evolution over time of total services imports and exports as captured in our data. These aggregate figures show a significant increase in both services exports and imports over the period of analysis. From 2009 to 2017, total services imports increased by 31% while total services exports increased by 38%. Finally, the TTN-DR microdata also reports the nationality of the counterpart involved in each transaction. After excluding international organizations, we remain with 220 countries as trade partners of Italian firms.

We merge the TTN-DR database with labor market data, taken from the Italian Social Security Agency INPS (*Istituto Nazionale di Previdenza Sociale*). The INPS dataset used in this paper covers the universe of Italian private firms. The variable of interest in this data is the number of employees, which is available for each year as well as for five occupational categories: managers, white collars, blue collars, apprentices, and the residual category "others." We focus only on the first three occupational categories, which comprise the large majority of workers.[8.]

Table 2 reports the mean and standard deviation of employment levels across three relevant populations: the universe of Italian firms covered in the INPS dataset, the population of services traders surveyed in the TTN-DR, and the population of importers–exporters, that is firms active on both the services imports and the services exports market. For the latter, we provide two alternative definitions. The first one identifies importers–exporters as firms that report at least one transaction recorded as services imports as well as one registered as services exports during the pre-sample period.[9.] The second definition classifies firms as importers–exporters if they engage simultaneously in services imports and exports for a number of years at least equal to half of the years they are observed in the data. For these four groups of firms, Table 2 also reports the mean

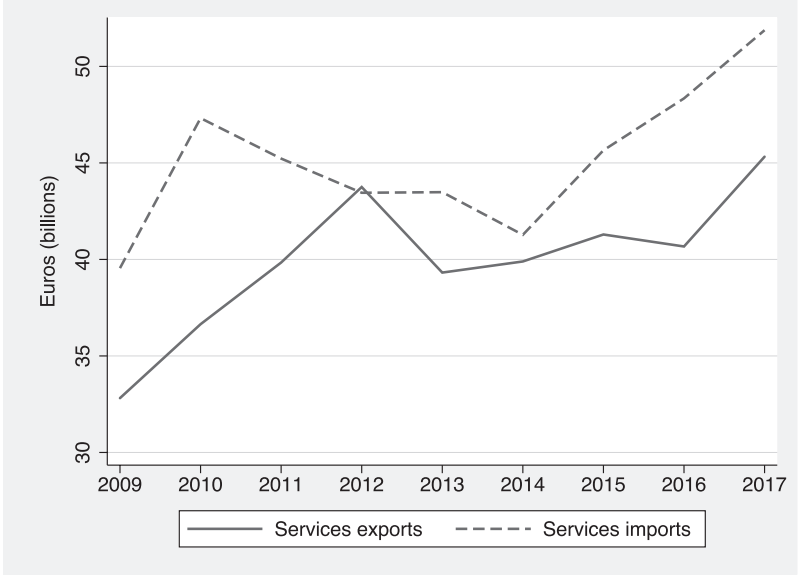


FIGURE 1 Services imports and exports over time

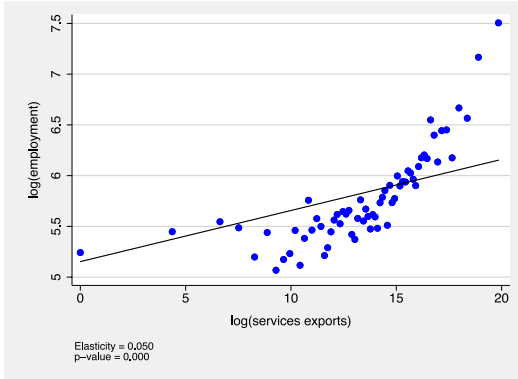
TABLE 2 Employment outcomes by type of firm

	All firms	Traders	Importers–exporters (pre-sample)	Importers–exporters (half sample)
Employment levels				
Total	9.120	747.4	865.4	906.1
	(183.9)	(1473.1)	(1609.5)	(1647.2)
Managers	0.0741	16.97	21.67	23.07
	(2.407)	(29.31)	(33.62)	(35.08)
White collars	3.645	418.3	504.5	534.7
	(176.2)	(911.1)	(1009.9)	(1050.5)
Blue collars	4.825	274.2	300.4	305.2
	(31.27)	(720.3)	(781.8)	(786.2)
Employment shares				
Managers	0.352	4.321	4.668	4.792
	(4.079)	(6.310)	(5.688)	(5.635)
White collars	36.27	60.86	62.83	64.17
	(40.31)	(27.84)	(26.86)	(26.73)
Blue collars	54.95	31.99	29.64	28.16
	(40.91)	(29.52)	(28.54)	(28.27)
Average wage				
Total	1394.0	3199.9	3329.1	3359.5
	(2716.7)	(1194.7)	(1210.0)	(1216.7)
Managers	9163.8	11587.1	11723.1	11833.0
	(7940.6)	(3820.3)	(3845.5)	(3856.9)
White collars	1678.8	3193.4	3277.5	3278.3
	(3333.7)	(757.6)	(746.3)	(754.6)
Blue collars	1273.4	2162.1	2184.7	2173.6
	(623.8)	(526.0)	(526.3)	(532.7)
Observations	9522157	15493	9928	9164

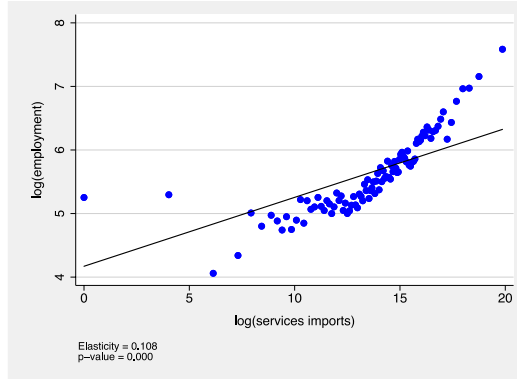
Notes: The table reports means with standard deviations in parenthesis. Computation of all measures uses the appropriate sampling weights.

and standard deviation of the employment shares across the three main occupational categories as well as of the total and occupation-specific average wage.

Table 2 shows that firms engaged in services trade tend to be much larger than the average Italian firm in terms of both total employment and for each occupational category. In relative terms, they employ on average higher shares of managers and white collars but lower shares of blue collars. They also pay on average higher wages in total as well as for each occupational category. These patterns are confirmed and even more pronounced for importers–exporters. This is consistent with the theory and the empirical findings by Kasahara and Lapham (2013), who find that firms both importing intermediates and exporting their output tend to be larger and more productive than firms active only in one of the two markets.



(a) Employment and services exports



(b) Employment and services imports

FIGURE 2 Total employment and services trade, exports and imports values. (a) Employment and services exports. (b) Employment and services imports

As a first, rough assessment of the relationship between services trade and employment in Italian firms, we estimate the elasticity of employment to services imports and exports in simple bivariate regression models. Figure 2 plots a graphical representation of this exercise. Both panels display a positive and statistically significant relationship between services trade performance and employment at the firm-level.[10.]

4 | EMPIRICAL FRAMEWORK

In order to better investigate the relationship between services trade and firm-level outcomes, the following econometric model is specified:

$$Y_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 I_{it} + \phi_{IND,t} + \psi_i + \varepsilon_{it} \tag{1}$$

where Y_{it} is alternatively defined as the natural logarithm of total employment, managers, white collars, and blue collars, of firm i in year t. The two explanatory variables of interest are E_{it} and I_{it}, representing the log of services exports and imports, respectively.[11.] Industry-by-year fixed effects, $\phi_{IND,t}$, control for all aggregate shocks affecting all firms within the same industry, (defined at the 2-digit level of the NACE Rev. 1.1 classification). Firms fixed effects, ψ_i, control for all time-invariant components of the firm's market environment and managerial practices, its productivity, size, ownership structure, and other firm characteristics.

Equation (1) is an *ad hoc* specification, designed to simultaneously and consistently identify the linkages between employment and the two directions of services trade. While Equation (1) allows for a clear identification of the relationship between services trade and employment within firms, it is not conclusive as for the empirical assessment of the effect of the former on the latter. In fact, a positive within-firm relationship between these two variables might not originate from the theoretical mechanisms explaining the impact of services trade on employment reviewed in Section 2. Consider for instance a variation in a firm's employment due to a shock that is exogenous to the firm's services trade performance (such as a fiscal policy shock targeting employment). Such variation might impact services trade by altering the resources available to

support the firm's services trade strategy. The identification challenge we face is that firm-level shocks to demand or productivity will affect both trade and labor market variables.

In order to minimize the risk of endogeneity, we adopt an instrumental variable approach following Hummels et al. (2014). We exploit shocks to the export supply and import demand of specific services sector–country pairs in the rest of the world (which are exogenous to Italy). We allocate these shocks to firms using the firm's relative exposure to each shock (combination of services sector and partner country as a share of firm total services trade flow). Relative firm exposures are computed in the initial year in which the firm is observed importing or exporting services. Formally, our instruments are constructed as follows:

$$IE_{it} = \sum_{c} \sum_{s} es_{isc} WES_{sct} \tag{2}$$

$$II_{it} = \sum_{c} \sum_{s} is_{isc} WID_{sct} \tag{3}$$

where es_{isc} and is_{isc} represent, respectively, the share of exports to and imports from country c of services sector s for firm i in the pre-sample year. The pre-sample year is either 2008 or the first year in which the firm is observed. In this second case, we use only data from the second year onwards for that firm in the regressions. WES_{sct} (world export supply) and WID_{sct} (world import demand) denote, respectively, country c's total supply and demand of services sector s to the world, minus their supply to and purchase from Italy at time t. We take bilateral services trade data from the WTO-UNCTAD-ITC annual trade in services dataset.[12.]

Ours is a classic shift-share identification strategy relying on the fact that the shares, es_{isc} and is_{isc}, are set in the pre-sample, and they represent trading relations that are stable over time. Firm i may have a long-standing business relationship with a client or supplier in country c for service s. This stability assumption holds in our dataset. Indeed, 85% of $c-s$ import and 93% of $c-s$ export flows by firms in-sample also appeared in the pre-sample period. Another requirement is the high level of specialization in the trading structure. Although the level of disaggregation for the services classification in our setting is limited to nine service categories, we find that the median service-origin and service-destination countries are actually imported and exported by only nine firms and this relation is similar in the pre-sample and in the in-sample periods. Over time there are shocks to the desirability of purchasing (selling) service s from (to) country c. These are captured by changes in the shifts variables, WES_{sct} and WID_{sct}, reflecting changes in export supply and import demand to the rest of the world. Because firm i purchases or sells service s from country c more than other firms, it disproportionately benefits from these changes.

This identification strategy assumes that foreign countries' service exports to (WES_{sct}) and imports from (WID_{sct}) the rest of the world have no other direct or indirect effect on firm-level outcomes, nor are they affected by Italian firms themselves or by other determinants of firms' decisions, conditional on firms and industry-by-year fixed effects.[13.] Based on this exclusion restriction, WES_{sct} and WID_{sct} can be used to construct instruments for service imports and exports as in Equations (2) and (3).

Table 3 describes the variables used in our final estimation sample which consists of an unbalanced panel of 2,461 firms over the period 2009–2017 for a total of 15,493 observations.

TABLE 3 Descriptives estimation sample

	Mean	*SD*	1st	25th	50th	75th	99th
Employment	747	1,473	4	112	295	691	9,204
Managers	17	29	0	3	7	17	176
White collars	418	911	2	55	141	364	5,930
Blue collars	274	720	0	0	56	238	4,861
log(employment)	6	2	2	5	6	7	9
log(managers)	2	1	0	1	2	3	5
log(white collars)	5	1	1	4	5	6	9
log(blue collars)	3	3	0	0	4	5	8
Services exports (thousands)	11,255	69,181	0	0	85	2,262	220,833
Services imports (thousands)	12,497	71,164	0	122	1,100	5,577	206,663
log(services exports (thousands))	9	7	0	0	11	15	19
log(services imports (thousands))	13	4	0	12	14	16	19

Notes: The table reports the mean, standard deviation, 1st, 25th, median, 75th, and 99th percentile of the variables used in the estimation sample. Number of firms: 2,461; number of observations: 15,493; years covered 2009–2017. Variables in logs are defined as $\log(1 + x)$.

5 | RESULTS

This section presents the main results on the effects of service trade on firm-level employment. Section 5.1 shows the effects of services imports and exports on total employment and on its main components by broad occupational category. Section 5.2 assesses the robustness of the baseline findings. Section 5.3 explores differences in the effects of services trade on employment for different subgroups of firms.

5.1 | Baseline results

We begin by assessing the effects of service imports and exports on firm-level employment using the fixed effects and the shift-share instrumental variable strategy described in Section 4. Table 4 reports our main results. Table A4 reports the first stages corresponding to our instrumental variable specifications. These first stages are both statistically and economically significant. They are slightly lower than those found in the literature (Ariu et al., 2019b; Eppinger, 2019; Hummels et al., 2014). This is due to the fact that our sample is an unbalanced panel and not all firms take part in the TTN-DR survey every year. Nevertheless, the values of the *F*-statistics for weak instruments remove any potential concern on the strength of our instruments.

According to the estimates in Table 4, higher services imports and exports increase firm-level employment. The instrumented service exports and imports increase firm-level employment by an elasticity of 0.029 and 0.043, respectively. This beneficial effect of service trade on employment is statistically significant and evenly spread across all types of workers: managers, white collars, and blue collars. Table A5 repeats our main estimates using the share of managers, white-collar workers, and blue-collar workers as outcome variables to confirm that the share of each of these three categories of workers did not change due to service trade.

TABLE 4 Service trade and employment

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	FE	IV-FE	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.0087***	.029***	.0058***	.025***	.0083***	.025***	.0077***	.026*
	(.0011)	(.011)	(.00093)	(.0071)	(.0011)	(.0097)	(.0018)	(.014)
log(services imports)	.031***	.043***	.022***	.039***	.032***	.048***	.026***	.07***
	(.0029)	(.014)	(.0022)	(.011)	(.0029)	(.013)	(.0037)	(.022)
Observations	15,493	15,493	15,493	15,493	15,493	15,493	15,493	15,493
Number of firms	2,461	2,461	2,461	2,461	2,461	2,461	2,461	2,461
F-stat. weak inst.		39		39		39		39

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 1% level.

These elasticities are economically significant. The estimates reported in column (2) of Table 4 suggest that an increase in service exports (imports) by 10%—about 1.1 (1.2) million Euros at the mean of the estimation sample—would create between 1 and 4 (1 and 5) new jobs in the average firm in this sample, which has about 750 employees. The effects of services imports are very much aligned with some recent findings in the literature obtained from similar settings in other European countries (see for instance the case of Germany discussed in Eppinger, 2019). Overall, these works confirm that the scale effect of higher services imports tends to overcome any potential substitution effect, benefitting workers across all occupational categories, including blue collars. The positive and significant effect of services exports on employment is consistent with the underlying theoretical mechanism and strongly resonates with the sign and magnitude of the findings in Lassmann and Spinelli (2020) for the case of UK firms.

By comparing the estimates of the instrumental variable models with those derived from fixed effects specifications we find consistent evidence of a negative bias in the latter. For the case of imports, this is again in line with the patterns highlighted by Eppinger (2019) looking at German firms and provides additional support for the downward bias explanations offered in that paper. Indeed, as in the German framework, we can posit that higher services imports are used by Italian firms as a tool to react to higher competition and negative shocks. After using fixed effects to control for the selection of larger firms into offshoring, this assumption implies a negative correlation between services imports and employment and explains the downward bias of the fixed effects estimates.[14.] This explanation can be extended to the case of exports. Higher services exports are a sign of servitization which, as pointed out above, can be a strategy to diversify a firm's output with respect to competitors and therefore to respond to a higher competition or other negative shocks.

5.2 | Robustness

In this section, we provide a set of robustness exercises to validate the baseline findings presented above. We begin by showing that the results reported in Table 4 are robust to the inclusion of merchanting and construction among service trade flows. Table A6 reports estimates of the effect of services trade on employment including merchanting and construction among exported and imported services. Our baseline results are robust to the inclusion of these sectoral categories. The sample in this robustness exercise augments by about 50 firms, which trade only in merchanting and/or construction services.

Moreover, as standard when using shift-share instrumental variables, we provide a simple placebo test for the credibility of our instruments by checking whether past changes in employment outcomes are related to future changes in services trade. More precisely we repeat our baseline analysis using as outcome variable employment in the years 1999–2007, while services imports and exports, and their corresponding instruments, are still defined in the years 2009–2017. Table A7 reports the results of this exercise. By looking at the IV estimates reported in columns (2), (4), (6), and (8) of Table A7, we find that there is no clear effect of service trade on past employment. This exercise also highlights the potential risk of not instrumenting service imports and exports. In fact, the fixed effects estimates reported in columns (1), (3), (5), and (7) show a statistically significant effect of service imports on past employment. Therefore, the fixed effects estimates in Table 4 could be biased, justifying the need for our instrumental variable approach to identify the effect of service trade on employment.

Additionally, we check the robustness of our main findings using the technique proposed by Borusyak et al. (2018), which transforms a shift-share instrumental variable regression into an equivalent shock-level regression. However, the method proposed by these authors does not fit our setting because we consider export and import shocks simultaneously, whereas this novel methodology creates product-country-level aggregates for one shock only. With this caveat in mind, Table A8 reports the results of our analysis using the Borusyak et al. (2018) estimator separately for imports and exports.[15.] The general pattern of our main estimates holds and there are no sufficient conditions to discard our baseline findings.

Furthermore, we replicate our estimation also clustering the standard errors at the level of the firm (see Table A9). We find overall robustness of our results to this correction. The only relationship where the estimated coefficient looses statistical significance in the IV-FE specification is that between services exports and blue-collar employment. However, given that our treatment variables (services trade performance) and the related instruments are assigned to firm-year individual units instead of being clustered at the firm level, we interpret clustering as not necessary in this framework (see Abadie et al., 2017) and we prefer to interpret results based on robust standard errors.

Finally, we test our results against alternative transformations of the main variables. First, following Clemens and Tiongson (2017); McKenzie (2017); Bahar and Rapoport (2018), we implement the inverse hyperbolic sine transformation (IHS). This transformation has the advantage of keeping the same interpretation of the coefficients as elasticities, like in a log-log model, while retaining zero-valued observations. As Appendix Table A11 shows, our results using the IHS are almost identical to our results using the $\log(1+x)$ transformation. Table A10 shows that the same applies to our first stages. Second, we use the simple log instead of $\log(1+x)$ but we analyze imports and exports separately. By doing this we limit the selection because, while it is rare for firms to import and export services at once, it is common (in our sample) to do at least one of the two. The results reported in Appendix Table A13 (first stage in Appendix Table A12) qualitatively confirm the positive effect of services trade performance on employment.

5.3 | Heterogeneity of baseline results

We now turn to the question of whether and how the baseline patterns of services trade's impact on employment are heterogeneous across aggregate sectors of firms affiliation, across the level of firms' integration in international services markets, and across different institutional frameworks.

Table 5 replicates the baseline instrumental variable estimation results of Table 4 across two subsets of our empirical population, characterized in terms of the main sectoral affiliation of the firms. In particular, we distinguish between services firms and firms whose main sectoral affiliation is registered in the broad industrial category which includes manufacturing as well as utilities and mining.[16.] The positive effect of services exports for total employment, for managers, and for white-collar employment is strongly confirmed for firms in industrial sectors, while the effect on blue collars is not significant. This suggests that servitization (or the practice of performing and exporting services alongside manufacturing output and exports) is a successful strategy for employment growth, especially of some key occupational categories of workers in industrial firms.[17.] Higher services imports have instead a positive and significant effect mainly for services firms. Moreover, when looking at services imports we do not find any negative and

TABLE 5 IV-FE estimates of service trade and employment by sector

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	Industrial	Services	Industrial	Services	Industrial	Services	Industrial	Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.036**	.015	.03***	.016*	.033**	.012	.028	.019
	(.017)	(.014)	(.011)	(.0093)	(.014)	(.015)	(.022)	(.016)
log(services imports)	.028	.069***	.031*	.063***	.031	.075***	.046*	.11***
	(.021)	(.023)	(.018)	(.019)	(.019)	(.024)	(.028)	(.043)
Observations	8,880	6,343	8,880	6,343	8,880	6,343	8,880	6,343
Number of firms	1,383	1,051	1,383	1,051	1,383	1,051	1,383	1,051
F-stat. weak inst.	15	20	15	20	15	20	15	20

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector by year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID). The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

statistically significant point estimate across all columns of Table 5, suggesting that the substitution effect of services imports is not significantly dominating for any occupational category nor in any sector of firms' affiliation.

Second, we explore whether and how the scope of firm integration in international services markets affects the impacts of services trade performance on firm employment. To this end, we replicate our baseline empirical model on importers–exporters, that is the subpopulation of firms engaged in both services exports and imports in the pre-sample period. Table 6 shows that services exports spur employment in importers–exporters. This result holds for total employment as well as the three occupational categories. The effect of services imports on total employment of importers–exporters is instead not significant, and this seems to be driven by the non-significant effect on blue collars. These results are almost reversed for non-importers–exporters: the effects of services imports are significant on total employment and on each occupational category including blue collars, while exports do not have any effect. This pattern suggests that services exports are an effective lever for higher levels of employment only in firms deeply integrated into international services markets. Services imports instead have a positive and significant role for non-importers–exporters, which makes this direction of services trade work at a lower degree of firms' integration. This implication is robust to the alternative definition of importers–exporters that only identifies as such firms that engage simultaneously in services imports and exports for a number of years at least equal to half of the period during which they are observed in the data (see estimates reported in Appendix Table 21).

Finally, we test whether the institutional environment shapes the effect of services trade performance on employment. In particular, we estimate the instrumental variable specifications separately on firms with headquarters in the northern regions of Italy and on those based in the central and southern regions.[18] Regional heterogeneity in economically relevant institutions is a well-established empirical regularity of the Italian context that originates from deep cultural differences (Putnam, 1993; Guiso et al., 2015). Stronger economic institutions in the northern part

TABLE 6 IV-FE estimates of service trade and employment by importers–exporters (defined in the pre-sample period)

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	I–E	No I–E	I–E	No I–E	I–E	No I–E	I–E	No I–E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.039***	-.023	.024**	.017	.034***	−.028	.051***	.045
	(.015)	(.039)	(.0096)	(.016)	(.012)	(.042)	(.02)	(.032)
log(services imports)	.034	.047***	.042**	.03**	.044**	.057***	.00077	.1***
	(.021)	(.018)	(.017)	(.014)	(.02)	(.018)	(.027)	(.034)
Observations	9,909	5,477	9,909	5,477	9,909	5,477	9,909	5,477
Number of firms	1,490	971	1,490	971	1,490	971	1,490	971
F-stat. weak inst.	17	9.6	17	9.6	17	9.6	17	9.6

Notes: I–E denotes the population of importers-=exporters. All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID). The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE 7 IV-FE estimates of service trade and employment by geographic area

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	North	Others	North	Others	North	Others	North	Others
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.026**	.029**	.021***	.029**	.021*	.031**	.029*	.01
	(.013)	(.013)	(.0076)	(.013)	(.011)	(.014)	(.015)	(.021)
log(services imports)	.04***	.04	.034***	.063*	.043***	.07*	.06***	.044
	(.014)	(.036)	(.011)	(.033)	(.013)	(.037)	(.022)	(.059)
Observations	12,268	3,108	12,268	3,108	12,268	3,108	12,268	3,108
Number of firms	1,960	536	1,960	536	1,960	536	1,960	536
F-stat. weak inst.	36	8.5	36	8.5	36	8.5	36	8.5

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector by year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID). The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

of Italy also explain the larger population of firms registered by the TTN-DR in that geographic area. Table 7 reports our estimates for the two samples. The sign, magnitude, and statistical significance of the point estimates confirm the positive effects of higher services trade performance across both geographic areas with one exception: neither services imports nor exports seem to play a significant role in raising blue-collar employment outside northern regions. For the case of services imports, this is also reflected in a non-significant effect of trade on total employment in the central and southern part of Italy.

These results suggest that the impact of services trade on manager and white-collar jobs is not significantly moderated by broad economic institutions varying across Italian macro-regions, strengthening its appeal as a robust tool for higher employment. However, the positive role of services trade performance on blue collars does not hold under weaker institutions.

Overall, the study of heterogeneous impacts of services trade performance shows the robustness of the positive effect of higher services imports across different economic contexts and firms' characteristics. The positive employment impact of services exports instead is precisely and consistently identified in particular for non-services firms and importers–exporters. This highlights the positive role of servitization for employment in Italian industrial sectors and suggests the need to complement an increase in services exports with a systematic engagement in services imports to benefit from and maximize its employment effects. Finally, the lack of an effect of services trade on blue collars outside the northern regions calls for special attention to this occupational category under weak institutions to further increase the employment gains of higher services trade.

6 | CONCLUSIONS

This paper offers new empirical evidence on the linkages between services trade and employment using data on both services imports and exports. Relying on microdata of Italian firms, we have estimated a robust, positive, and statistically significant effect of both directions of services

trade on firm total employment as well as on employment of managers, white-collar workers, and blue-collar workers.

Three additional findings complement this general result. First, we show that manufacturing firms are those for which services exports are particularly effective in raising employment. This confirms that performing and exporting services as a process of servitization results in higher employment at the firm level. Second, we find that services exports are an effective lever for higher levels of employment only for "importers–exporters," defined as those firms simultaneously sourcing services inputs from and exporting services output to the international services market. Services imports instead have a positive and significant role for non-importers–exporters, which makes this direction of services trade work at a lower degree of firms' integration into the international services market. Third, the positive effect of both services imports and exports for managers and white collars does not seem to be affected by the quality of economic institutions in the area where firms are located. This strengthens the appeal of services trade as a robust tool for higher employment under different institutional frameworks. However, our estimates also warn that blue-collar workers fail to benefit from services trade under weak institutions.

This research has important policy implications. The robust and positive effect of services trade performance on employment identified in our paper highlights a strong potential for services trade liberalization. According to the 2020 OECD Services Trade Restrictiveness Index, Italy is significantly above the OECD average in terms of policy barriers to services trade (OECD, 2021). Our findings support national efforts to reduce domestic, non-discriminatory, behind-the-border barriers to services trade as well as a multilateral agenda for higher openness of services markets and services trade facilitation.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interests.

ENDNOTES

1. For an analysis on the comparison of services trade in Italy with other advanced countries, see Moro and Tosti (2019).
2. Imported inputs can embody superior technology or trigger productivity-enhancing actions by the firm directly changing the shape of its pareto possibility frontier (Fiorini et al., 2021; Koren & Tenreyro, 2013).
3. Addressing a similar question with a focus on the policy dimension of services trade, Fiorini et al. (2018) use sector-level data for 24 transition economies and find a negative effect of services trade liberalization on downstream employment. However, this negative impact on downstream employment is mitigated in countries with better economic governance and human capital.

4. The data does not allow us to identify transactions made between companies under common control, preventing us from accounting for the incidence of transfer pricing in our analysis.
5. The General Agreement on Trade in Services (GATS) identifies and disciplines four modes of services trade. Mode 1 captures arms-length cross-border trade (e.g. services cross the border through the internet). Mode 2 is for consumption abroad (e.g. travels). Mode 3 considers services exported through the establishment of a commercial presence in the importing country (i.e. Foreign Direct Investment, FDI). Mode 4 describes trade through the temporary movement of the exporter's personnel in the importing country. Comprehensive discussions of the four modes can be found in Francois and Hoekman (2010) or WTO (2019).
6. Table A1 in the appendix reports for each year the number of firms represented by the TTN-DR and covered in our final estimation sample. We label these firms as "traders." The table also reports the number of "importers–exporters" (see the two alternative definitions below in this section). The population of traders accounts every year for about 0.3% of the universe of limited liability Italian firms registered in other databases. Table A2 instead reports the share of turnover and employment accounted for by the firms in the TTN-DR database over time. Finally, Table A3 reports the shares of industrial and services firms for each direction of services trade as well as the sector-specific volumes of trade in services.
7. These nine categories maximize consistency over time in the concordance between the sectoral categories in the TTN-DR database and the EBOPS 2010/BPM6 classification system in the bilateral global services trade database managed by the WTO, UNCTAD, and ITC used for the construction of our instrumental variables (see Section 4). EBOPS 2010 complementary groupings such as "Total services transactions between related enterprises" are not included in the data.
8. Due to lack of a clear-cut interpretation of the content of the remaining two categories (apprentices and others), we do not report category-specific results for them but we do not remove them from the data when considering the total employment level. The three categories considered in the analysis account for about 97% of the total employees.
9. The pre-sample period is set either at 2008 or at the first year in which the firm is observed if that is different from 2008.
10. For the sake of clarity in an empirical context with a large number of observations the scatterplots in Figure 2 are binned. They have been generated using the *binscatter* command in STATA. Since the command does not allow for the use of weights, the coefficients and p-values reported below each scatterplot are instead derived from bivariate regressions featuring the appropriate survey weights.
11. The correlation between services exports and imports is 0.2102 with a p-value well below 0.01. As long as the correlation between these two variables is smaller than 1 there is hope to separately estimate the two parameters α_1 and α_2. The precision of these estimates is inversely proportional to their correlation.
12. The WTO-UNCTAD-ITC dataset is publicly available at https://www.wto.org/english/res_e/statis_e/trade_datasets_e.htm. We merged the WTO-UNCTAD-ITC dataset with the Italian firm level using a simple concordance between nine aggregate services sectors in the TTN-DR dataset and EBOPS 2010 (up to 3 digits) services sectors in the WTO-UNCTAD-ITC dataset.
13. An argument to support the validity of this exclusion restriction is the limited role of Italian firms in the world trade of services. Considering the selected services sectors and period of analysis (2008–2017), Italian firms account for 2.07% of global services imports and 1.62% of exports. Our approach is not without limitations. For instance, in an ideal empirical setting one would like to control for goods trade at the level of the firm. This is unfortunately not possible in the context of our analysis as we do not have access to a firm-level trade database that allows to consistently identify trade flows of manufactured goods.
14. Indirect support to this argument is offered by Bamieh et al. (2020). These authors find that, in the case of US local labor markets, higher services inputs use can be an effective tool to respond to the negative employment effects of increasing import competition from China.
15. Estimates are computed using the Stata package *ssaggregate* written by the same authors.
16. Industrial firms operate in NACE two-digits sectors from 05 to 39. These sectors include mining and quarrying, manufacture, electricity and gas supply, and water and waste management. Services firms operate in NACE two-digits sectors from 45 to 98.

17. Our data do not include measures of goods trade and therefore they do not allow to precisely identify the empirical phenomenon of servitization. Looking at the role of services exports in firms affiliated to a non-services sector (assuming that a significant share of their output and export is accounted for by products other than services) is a second best strategy to identify empirically the phenomenon of servitization.
18. North of Italy includes the following regions: Aosta Valley, Piedmont, Lombardy, Liguria, Trentino Alto Adige, Veneto, Emilia Romagna, and Friuli Venezia Giulia. Regions correspond to NUTS level 2 administrative units, using the territorial nomenclature defined by Eurostat.

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APPENDIX A

TABLE A1 TTN-DR represented firms by year

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Traders	2063.0	2838.0	3287.0	3635.0	3554.7	3899.2	3562.9	3660.2	3697.6
Importers–exporters (pre-sample)	1528.6	1885.2	2096.5	2246.8	2133.7	2327.5	2150.8	2197.9	2209.2
Importers–exporters (half-sample)	1302.4	1718.1	1924.6	2059.7	2014.1	2149.7	2024.6	2067.5	2070.5

Notes: The table reports the number of firms in the estimation sample each year. Computation of all measures uses the appropriate sampling weights.

TABLE A2 Share of employment and turnover

	Share of turnover	Share of employment
2009	0.1912	0.0937
2010	0.2107	0.1227
2011	0.2348	0.1344
2012	0.2635	0.1475
2013	0.2728	0.1486
2014	0.2664	0.1501
2015	0.2684	0.1549
2016	0.2821	0.1478
2017	0.2555	0.1381

Notes: The table reports, for each year, the share of turnover and employment of the firms considered in this study relative to that of the population of Italian firms. Total turnover is computed using data from the Italian National Statistical Office.

TABLE A3 Firms and trade volumes in industrial and services sectors

	Share of importing firms	Share of exporting firms	Total value of imports	Total value of exports
Industrial	0.56	0.57	96901	103138
Services	0.44	0.43	113708	87196

Notes: The table reports the sectoral shares of firms for each direction of services trade as well as the sector-specific volumes of trade in services. Trade volumes are measured in million Euros.

TABLE A4 First-stage

	log(services exports)						
	Full sample	Industrial	Services	North	Others	I–E	No I–E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
log(exports instruments)	.11***	.11***	.11***	.11***	.12***	.096***	.13***
	(.0098)	(.014)	(.014)	(.011)	(.022)	(.011)	(.03)
log(imports instruments)	.0032	.017	−.008	−.0041	.019	.012	.012
	(.0095)	(.016)	(.011)	(.011)	(.018)	(.015)	(.012)
	log(services imports)						
log(exports instruments)	.017***	.025***	.0053	.019***	.0047	.018***	−.044
	(.0048)	(.0061)	(.0073)	(.0056)	(.0099)	(.0045)	(.03)
log(imports instruments)	.059***	.067***	.05***	.064***	.054***	.07***	.054***
	(.0058)	(.0086)	(.0082)	(.0067)	(.012)	(.01)	(.0063)
Observations	15,493	8,880	6,343	12,268	3,108	9,909	5,477
Number of firms	2,461	1,383	1,051	1,960	536	1,490	971

Notes: I–E denotes the population of importers–exporters. Each column refers to each different subsample used in the analysis. All regressions use the appropriate sampling weights, and control for firms fixed effects and sector-by-year fixed effects. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A5 Service trade and shares of managers, blue collars, and white collars

	Share managers		Share white collars		Share blue collars	
	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)
log(services exports)	−.0059	.064	−.033**	−.17	.029*	.087
	(.0069)	(.077)	(.015)	(.14)	(.015)	(.14)
log(services imports)	−.046*	−.044	.011	.096	.072**	.054
	(.024)	(.087)	(.034)	(.21)	(.032)	(.21)
Observations	15,493	15,493	15,493	15,493	15,493	15,493
Number of firms	2,461	2,461	2,461	2,461	2,461	2,461
F-stat. weak inst.		39		39		39
Mean outcome	4.2	4.2	60	60	33	33

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. Outcome variables are defined as the ratio between the number of managers, white collars, and blue collars, and the total number of employees. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen-Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A6 Robustness test including construction and merchanting

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	FE	IV-FE	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.0088***	.024***	.0061***	.021***	.0083***	.02**	.0078***	.023**
	(.0011)	(.009)	(.00092)	(.0058)	(.0011)	(.0079)	(.0016)	(.011)
log(services imports)	.029***	.039***	.021***	.035***	.03***	.045***	.023***	.059***
	(.0029)	(.013)	(.0021)	(.011)	(.0027)	(.013)	(.0034)	(.021)
Observations	15,771	15,771	15,771	15,771	15,771	15,771	15,771	15,771
Number of firms	2,509	2,509	2,509	2,509	2,509	2,509	2,509	2,509
F-stat. weak inst.		46		46		46		46

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is is the Kleibergen-Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A7 Placebo for main outcomes

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	FE	IV-FE	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.0033	.026	.0018	.04*	.0027	.024	.0068	.041
	(.0033)	(.025)	(.0027)	(.021)	(.0032)	(.024)	(.0042)	(.032)
log(services imports)	.013*	.08	.01*	.05	.014**	.071	.012	.075
	(.0072)	(.053)	(.0054)	(.04)	(.0069)	(.05)	(.0084)	(.067)
Observations	15,493	15,493	15,493	15,493	15,493	15,493	15,493	15,493
Number of firms	2,461	2,461	2,461	2,461	2,461	2,461	2,461	2,461
F-stat. weak inst.		39		39		39		39

Notes: The table reports results of the regressions of the main outcomes in the years 2000–2008 on service trade in the in-sample period (2009–2017). All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A8 Robustness test for IV shift-share estimates based on Borusyak et al. (2018)

	log(services imports)			
	log(employment)	log(managers)	log(white collars)	log(blue collars)
	(1)	(2)	(3)	(4)
log(services exports)	.046**	.031	.047**	.044*
	(.02)	(.019)	(.019)	(.027)
Observations	8,629	8,629	8,629	8,629
log(services imports)	.12***	.085***	.11***	.13***
	(.038)	(.025)	(.033)	(.047)
Observations	8,500	8,500	8,500	8,500

Note: The table reports results from the product-country-level aggregates for shift-share IV following the methodology proposed by Borusyak et al. (2018).

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A9 Clustering adjustment to standard errors

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	FE	IV-FE	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.0087***	.029*	.0058***	.025***	.0083***	.025*	.0077***	.026
	(.0016)	(.015)	(.0014)	(.0096)	(.0016)	(.014)	(.0026)	(.019)
log(services imports)	.031***	.043**	.022***	.039***	.032***	.048***	.026***	.07**
	(.0043)	(.017)	(.0031)	(.014)	(.0042)	(.017)	(.005)	(.032)
Observations	15,493	15,493	15,493	15,493	15,493	15,493	15,493	15,493
Number of firms	2,461	2,461	2,461	2,461	2,461	2,461	2,461	2,461
F-stat. weak inst.		24		24		24		24

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are defined as $\log(1 + x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Standard errors in brackets are clustered at the firm level.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A10 First-stage—robustness Inverse Hyperbolic Sine Transformation (IHS)

	ihs(services exports)						
	Full sample	Industrial	Services	North	Others	I–E	No I–E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ihs(exports instruments)	.11***	.11***	.11***	.12***	.13***	.097***	.13***
	(.01)	(.014)	(.014)	(.011)	(.023)	(.011)	(.03)
ihs(imports instruments)	.0031	.017	−.0082	−.0044	.019	.012	.013
	(.0097)	(.016)	(.012)	(.011)	(.019)	(.015)	(.013)
	ihs(services imports)						
ihs(exports instruments)	.016***	.024***	.0043	.018***	.0036	.018***	−.045
	(.0048)	(.0062)	(.0073)	(.0056)	(.01)	(.0045)	(.031)
ihs(imports instruments)	.059***	.067***	.049***	.064***	.054***	.07***	.053***
	(.0058)	(.0086)	(.0084)	(.0068)	(.012)	(.01)	(.0063)
Observations	15,493	8,880	6,343	12,268	3,108	9,909	5,477
Number of firms	2,461	1,383	1,051	1,960	536	1,490	971

Notes: I–E denotes the population of importers–exporters. Each column refers to each different subsample used in the analysis. All regressions use the appropriate sampling weights, and control for firms fixed effects and sector-by-year fixed effects. All variables in log are transformed using the the inverse hyperbolic sine transformation, $\ln\left(x+\sqrt{x^2+1}\right)$. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A11 Service trade and employment—robustness Inverse Hyperbolic Sine Transformation (IHS)

	ihs(employment)		ihs(managers)		ihs(white collars)		ihs(blue collars)	
	FE	IV-FE	FE	IV-FE	FE	IV-FE	FE	IV-FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ihs(services exports)	.0084***	.029***	.0063***	.027***	.008***	.025**	.0079***	.026*
	(.0011)	(.011)	(.001)	(.0081)	(.0011)	(.0099)	(.0019)	(.015)
ihs(services imports)	.03***	.044***	.024***	.046***	.031***	.05***	.027***	.084***
	(.0029)	(.014)	(.0025)	(.013)	(.0029)	(.014)	(.0039)	(.025)
Observations	15,493	15,493	15,493	15,493	15,493	15,493	15,493	15,493
Number of firms	2,461	2,461	2,461	2,461	2,461	2,461	2,461	2,461
F-stat. weak inst.		39		39		39		39

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. All variables in log are transformed using the the inverse hyperbolic sine transformation, $\ln\left(x+\sqrt{x^2+1}\right)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A12 First-stage—log(x)

	log(services exports)				
	Full sample	**Industrial**	**Services**	**North**	**Others**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
log(exports instruments)	.12***	.11***	.15***	.12***	.16***
	(.025)	(.026)	(.052)	(.026)	(.057)
Observations	7,436	4,313	3,021	6,037	1,243
Number of firms	2,856	1,529	1,281	2,230	661
	log(services imports)				
log(imports instruments)	.22***	.23***	.2***	.23***	.17***
	(.018)	(.023)	(.03)	(.021)	(.045)
Observations	13,026	7,689	5,151	10,409	2,498
Number of firms	2,856	1,529	1,281	2,230	661

Notes: Each column refers to each different subsample used in the analysis. All regressions use the appropriate sampling weights, and control for firms fixed effects and sector-by-year fixed effects. Robust standard errors are reported in brackets.
***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A13 Service trade and employment—robustness logs(x) instead of log(x+1)

	log(employment)				log(managers)				log(white collars)				log(blue collars)			
	FE	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**	**FE**	**IV-FE**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**
log(services exports)	.044***	.25***			.038***	.23***			.043***	.23***			.034***	.43***		
	(.0051)	(.073)			(.0053)	(.071)			(.0049)	(.066)			(.008)	(.16)		
log(services imports)			.093***	.17***			.076***	.18***			.092***	.18***			.097***	.15***
			(.007)	(.03)			(.0062)	(.034)			(.0068)	(.028)			(.012)	(.046)
Observations	7,436	7,436	13,026	13,026	6,945	6,945	11,820	11,820	7,436	7,436	13,026	13,026	5,493	5,493	9,924	9,924
Number of firms	2,856	2,856	2,856	2,856	2,486	2,486	2,486	2,486	2,856	2,856	2,856	2,856	2,255	2,255	2,255	2,255
F-stat. weak inst.		24		139		20		117		24		139		16		119

Notes: All regressions use the appropriate sampling weights and control for firms fixed effects and sector-by-year fixed effects. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID) in the IV-FE columns. The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.
***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

TABLE A14 IV-FE estimates of service trade and employment by importers–exporters (defined as at least half of the years in sample both imports and exports)

	log(employment)		log(managers)		log(white collars)		log(blue collars)	
	I–E	No I–E	I–E	No I–E	I–E	No I–E	I–E	No I–E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(services exports)	.047***	−.012	.023**	.017	.041***	−.0095	.046**	.0017
	(.018)	(.014)	(.01)	(.011)	(.015)	(.015)	(.021)	(.019)
log(services imports)	.067**	.027**	.064***	.03**	.069**	.038***	.054	.064**
	(.029)	(.014)	(.021)	(.013)	(.027)	(.013)	(.034)	(.029)
Observations	9,141	6,243	9,141	6,243	9,141	6,243	9,141	6,243
Number of firms	1,363	1,098	1,363	1,098	1,363	1,098	1,363	1,098
F-stat. weak inst.	15	14	15	14	15	14	15	14

Notes: I–E denotes the population of importers–exporters. All regressions use the appropriate sampling weights and control for firms fixed effects and sector by year fixed effects. All variables in log are defined as $\log(1+x)$. log(services exports) and log(services imports) are instrumented using world export supply (WES) and world import demand (WID). The *F*-stat. for weak instruments is the Kleibergen–Paap Wald statistic. Robust standard errors are reported in brackets.

***Significant at the 1% level.; **Significant at the 5% level.; *Significant at the 10% level.

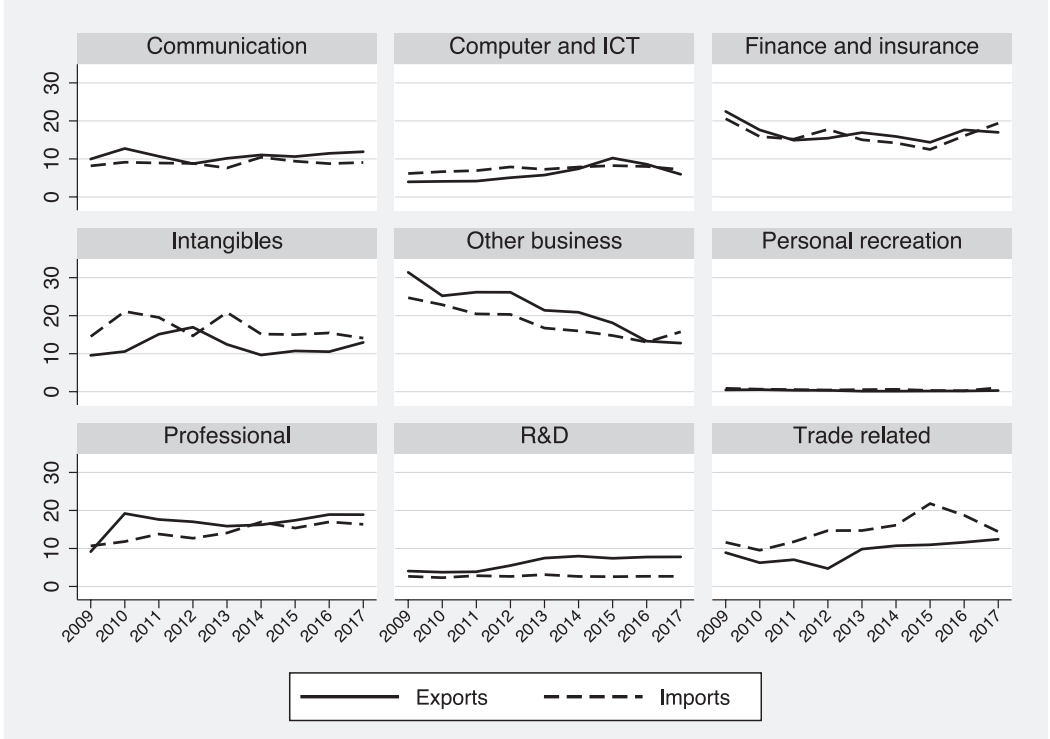

FIGURE A1 Services imports and exports by sector and over time