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The Size Composition of tradable Industries and Local Multipliers: Evidence from Italy

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The Size Composition of tradable Industries and Local Multipliers: Evidence from Italy

Filippo Berti Mecocci & Marco Bellandi

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Abstract

Do local employment responses depend on how changes in tradable industries are distributed across establishment–size classes? This paper studies whether local employment responses vary with the establishment–size composition of changes in tradable industries. Using establishment and personnel data for Italian local labor market areas over 2012–2020, we estimate local employment responses associated with changes recorded in four contemporaneous establishment–size cells. In a homogeneous specification, one additional tradable job generates 1.26 jobs in non–tradable industries. Allowing multipliers to vary by establishment size reveals substantial heterogeneity: employment increases recorded in medium–size cells are associated with the largest non–tradable industries response, followed by small–size cell, while the effect is smaller for large–size cell and statistically indistinguishable from zero for the micro–size cell. We interpret this pattern through two channels: larger establishments strengthen local demand through higher wages, whereas small and medium establishments generate stronger local cost–linkages through denser production networks. ***JEL codes***— R12, L25

Keywords— Local Multipliers, Establishment Size, Tradable Sectors, Italian Local Labor Market Areas

1 Introduction

Do local employment responses depend on how changes in tradable industries are distributed across establishment–size classes? This is a first–order policy question, since establishment size shapes productivity, wages, innovation, and employment dynamics (Bloom et al., 2018; Glaeser et al., 2015; Lucas, 1978). It is also central to current debates on the allocation of public funds (Brown et al., 2024; Chatterji et al., 2014), which often contrast the attraction of large establishments with support for networks of small and medium enterprises (SMEs). Larger establishments may be associated with stronger local demand, whereas smaller establishments may sustain denser local production linkages.

To study these differential contributions, we build on the standard framework of local employment multipliers (Moretti, 2010). The framework distinguishes between tradable and non–tradable activities and emphasizes that an expansion of the local export base brings income from outside the area, thereby increasing demand for locally produced goods and services (Malizia et al., 2020). This initial increase in local income generates successive rounds of expenditure, supporting employment growth in non–tradable industries. Accordingly, tradable activities are defined as industries that primarily sell goods and services to customers located outside the local economy. From this perspective, the key question is whether the response of local non–tradable employment differs depending on whether a change in tradable employment is recorded primarily in micro, small, medium, or large establishment cells. Our conceptual framework highlights why the same aggregate change in tradable employment may be associated with different local adjustments depending on its distribution across establishment–size cells. Two channels may account for this heterogeneity: a *local consumption* channel operating through demand for non–tradable goods and services, and a *cost–linkage* channel operating along local value chains. The relative importance of these channels may vary with the establishment–size composition of the observed change in tradable employment.

The literature on local multipliers has shown that wages paid in the tradable sector are an important factor affecting local multipliers (Moretti & Thulin, 2013). High–wage tradable sectors strengthen the local consumption channel and thereby enlarge non–tradable multipliers. Firm size is also systematically related to wage levels: large firms tend to pay higher wages than smaller ones, giving rise to a large–firm wage premium (Bloom et al., 2018). By contrast, smaller establishments rely more heavily on local subcontracting, a pattern consistent with stronger propagation to other tradable industries (Abraham & Taylor, 1996; Bellandi, 2009) and, in turn, to employment in non–tradable industries.

We contribute to this debate in two ways. Conceptually, we extend the standard local multiplier framework by allowing the response of non–tradable employment to depend on the size–cell composition of employment changes in tradable industries. This implies that the equilibrium allocation of employment between tradable and non–tradable activities may vary with the composition of the initial tradable shock. By general–equilibrium response, we refer to the observed adjustment of non–tradable employment resulting from the multiple, and potentially offsetting, forces triggered by an expansion of tradable activity. Empirically, we estimate heterogeneous local employment responses across establishment–size cells for Italian local labor market areas (LMAs), the Italian equivalent of travel–to–work areas. We combine Istat data on establishments and personnel to estimate size–cell multipliers for jobs in non–tradable industries and to characterize heterogeneity across size cells. Leveraging high–dimensional fixed effects, we obtain precise estimates of heterogeneous responses across establishment–size cells and quantify how the non–tradable employment response varies across changes recorded in those cells.

We compute local job multipliers for four establishment–size classes in tradable sectors: micro (0–9 employees), small (10–49), medium (50–249), and large (250 or more). Establishments are assigned to size classes separately in each year on the basis of contemporaneous employment. Because the data do not allow us to track establishments over time, these classes should be interpreted as annual employment cells rather

than fixed groups of establishments. An establishment classified as medium in year (t, for example, may be classified as large in year ($t + 3$), contributing in each year to the size cell to which it is then assigned.

Italy over 2012–2020 provides a particularly informative setting for two reasons. First, non–tradable employment expanded even though aggregate tradable employment contracted, while the size composition of tradable employment changed markedly: employment recorded in the micro and small cells declined, whereas employment recorded in the medium and large cells increased. These net cell–level changes may reflect growth or contraction among establishments remaining within a size class, establishment entry and exit, and movements across size thresholds. Second, Italian local production systems are highly heterogeneous. Large urban economies coexist with industrial districts characterized by a strong concentration of tradable activity in small and medium establishments (Accetturo et al., 2019; Bellandi, 1989). This spatial organization generates substantial cross–LMA variation in both the tradable–to–non–tradable employment mix and the size–cell composition of tradable employment, providing a useful setting in which to study heterogeneous local multipliers. These features motivate our empirical strategy and sharpen the central policy question even within a single–country setting.

First, in a baseline specification that mirrors the standard homogeneous approach in the local multiplier literature (Moretti, 2010), one additional tradable job generates 1.26 non–tradable jobs. Second, our estimates reveal substantial heterogeneity in local multipliers across establishment–size cells. A one–unit increase in tradable employment assigned to the medium–size cell is associated with the largest non–tradable employment response, with a coefficient of nearly three. The corresponding size–cell multiplier is 1.91 for the small cell and 1.61 for the large cell, while the micro–cell coefficient is statistically indistinguishable from zero. These estimates capture equilibrium outcomes rather than isolated causal mechanisms. That is, the multipliers summarize the net general–equilibrium adjustment triggered by shocks to tradable employment, without separately identifying the channels through which this adjustment operates and potential offsetting forces.

We therefore interpret this reduced–form heterogeneity through two mechanisms underlying the aggregate multiplier: the *local consumption* channel and the *cost–linkage* channel. In particular, we examine whether the variation across size cells is consistent with differences in the relative importance of these two mechanisms. The evidence reveals a clear pattern. We discipline the tradable–to–non–tradable multipliers by interacting changes in tradable employment with predetermined wages specific to each size class. The resulting fitted size–cell coefficients increase monotonically with establishment size. The *large–firm wage premium* raises the local wage bill by increasing income per worker, but also puts upward pressure on the local wage index. As a result, the increase in local demand generated by higher wages may be partly offset by tighter cost conditions for other tradable establishments. By contrast, we capture reduced–form propagation through local production linkages by estimating how a shock to an LMA–size–class–2–digit–industry cell affects employment in its five most strongly connected upstream and downstream tradable industries. The larger coefficients for small and medium establishments are consistent with stronger localized input–output linkages and a larger employment response in connected tradable activities.

The remainder of this article is organized as follows. Section 2 presents some branches of the literature strictly related to this contribution. Section 3 lays out the conceptual framework and possible general–equilibrium interpretations of heterogeneity across establishment–size cells. Section 4 presents recent evidence on the composition of tradable and non–tradable sectors in Italy. Section 5 presents the econometric framework, focusing on the identification strategy and potential endogeneity issues. Section 6 reports the main empirical results. Section 7 assesses whether the empirical pattern is consistent with the channels depicted in Section 3. Section 8 discusses interpretation of the results, and Section 9 concludes.

2 Related Literature

This paper first relates to the literature on local employment multipliers. Moretti (2010) document a positive tradable–to–non–tradable jobs multiplier in U.S. cities, and Moretti and Thulin (2013) show that this effect is stronger in high human–capital activities, where wage responses are larger. For Italy, De Blasio and Menon (2011) detect no positive multiplier on average, whereas Cerqua and Pellegrini (2020) find significant effects in the Mezzogiorno regions. Other studies extend the analysis to different contexts and shocks: Faggio and Overman (2014) estimate local multipliers for public employment and report no effects on private jobs, attributing this null result to a compositional displacement whereby public jobs crowd out employment in tradable industries while expanding non–tradable activities. Conversely, Jofre-Monseny et al. (2020) find crowd–in effects of public employment on private jobs, concentrated primarily in non–tradable industries, a result corroborated by Faggio et al. (2025).

Further evidence confirms that multipliers vary widely across settings: Wang and Chanda (2018) report a positive average multiplier across Chinese prefectures; Osman and Kemeny (2022) find that each additional tradable job generates on average only 0.51 non–tradable jobs; and Gutierrez-Posada et al. (2023) document positive but relatively small spillovers from creative industries. Closer to our contribution, Van Dijk (2017) revisit Moretti (2010) across U.S. cities and show that high–wage tradable sectors exhibit stronger spillovers than low–wage ones, a finding that anticipates the large–establishment wage premium as a possible interpretation of multiplier heterogeneity.

Second, this paper relates to the literature on agglomeration externalities and establishment size. Agglomeration externalities often materialize as productivity gains for incumbent establishments when large establishments open in nearby areas (Greenstone et al., 2010) or even in more distant locations (Giroud et al., 2024), operating via knowledge spillovers and the diffusion of better management practices (Bloom et al., 2019). Several contributions emphasize that these forces interact with establishment size. Li et al. (2012) find that establishments in agglomeration tend to be larger, and that co–location with other large establishments further amplifies their size. Glaeser et al. (2010) and Drucker and Feser (2012) show that entrepreneurship (new firms openings) is more intense in places where incumbent establishments are relatively small, and Glaeser et al. (2015) find that localities with a larger community of small establishments experience stronger subsequent employment growth. Alcácer and Chung (2014) report that smaller establishments place greater value on agglomeration–related productivity gains, while Lafourcade and Mion (2007) show that small establishments have a greater tendency to locate in adjacent high–density areas.

Third, this paper relates to the literature on outsourcing decisions, vertical integration, and local production systems. Traditional theories of clusters, local production systems, and industrial districts emphasize that the co–location of establishments reduces transportation and transaction costs (Becattini & Musotti, 2003; Porter et al., 1998). A central mechanism is the local *division of labor*: establishments specialize in narrower stages of production and trade intermediate inputs locally, generating productivity gains through finer specialization and complementary capabilities (Bellandi, 2002; Glaeser et al., 2010). Importantly, these gains depend less on the sheer number of establishments than on the presence of vertically related establishments and industries within the same cluster, which sustains dense input–output linkages along the production process (Cainelli et al., 2019). Empirical contributions show that vertical disintegration is higher in areas where industries agglomerate (Figueiredo et al., 2010; Quan, 2025): proximity reduces opportunism and facilitates relational contracting, inducing establishments to substitute within–establishment vertical integration with inter–establishment transactions (Helsley & Strange, 2007; Holl, 2008; Ono, 2007).

Our contribution to these strands of the literature is to show that local multipliers vary systematically across contemporaneous establishment–size cells. Building on these contributions, we argue that large–

establishment wage premia have important implications for tradable–to–non–tradable multipliers, while outsourcing decisions and the local division of labor among specialized establishments can produce stronger propagation across tradable industries. Together, these two margins shape the general–equilibrium adjustment to tradable demand shocks and provide insights into the dynamics of size–dependent agglomeration processes.

3 Conceptual framework and mechanisms

In what follows, we outline a simple conceptual mechanism that explains the main direct and indirect effects of a change in jobs in tradable industries. As in Moretti (2010), consider a permanent increase in local labor demand in the tradable sector. The direct effect is an increase in tradable employment. The broader local adjustment depends on the elasticities of labor and housing supply. When these elasticities are sufficiently high, adjustment takes place primarily through quantities; when they are low, adjustment occurs more through prices, with higher wages and rents. We assume that local labor and housing supply are neither perfectly elastic nor perfectly inelastic, so that a positive tradable shock affects both local quantities and prices. Beyond its direct effect, the shock therefore generates indirect effects throughout the local economy through general–equilibrium adjustment.

These indirect effects operate through two main demand–side channels. The first is a *local consumption* channel, whereby higher wages and employment in tradable activities raise local demand for non–tradable goods and services. The second is a *cost–linkage* channel, whereby the expansion of tradable establishments increases demand for intermediate inputs and business services supplied by other local establishments. Both channels can therefore support additional local employment beyond the direct change in tradable employment.

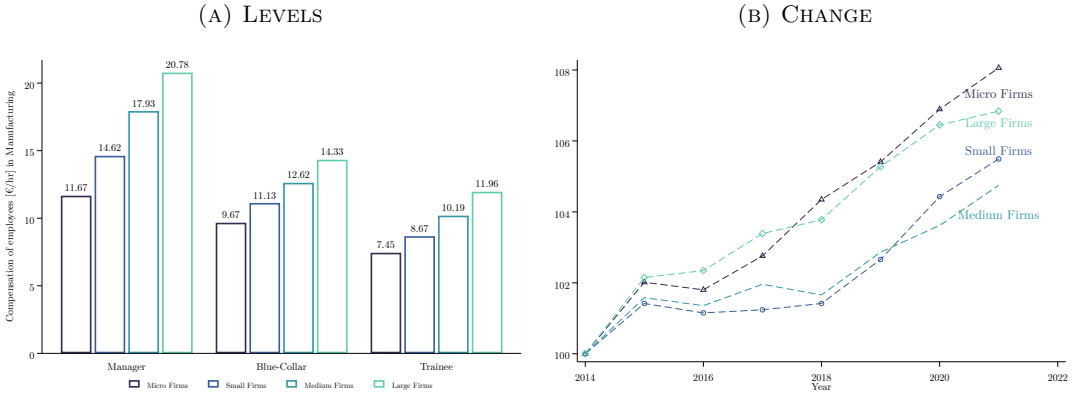
Our focus is on how the strength of these channels varies with establishment size. Wage premia, sourcing strategies, and supply–chain embeddedness differ systematically across micro, small, medium, and large establishments. As a result, identical increases in tradable employment need not be associated with the same local employment response across size cells. This motivates our empirical analysis of heterogeneous local multipliers across establishment–size cells. Throughout, we use *establishment* to denote the local unit recorded in the Istat data. Most micro establishments, and a substantial share of small establishments, correspond to single–establishment enterprises, although some may be local units of larger multi–establishment firms.

Local consumption channel. A well–established mechanism linking employment in tradable industries to local jobs is the *local consumption* effect. The creation of a new tradable job raises household income and, in turn, demand for local non–tradable goods and services. This higher demand expands employment in sectors such as retail, hospitality, and personal services. The strength of this effect depends on the magnitude of income gains (Moretti & Thulin, 2013; Van Dijk, 2017) and on the share of income that is spent locally rather than leaking out to other areas (Malizia et al., 2020).

Establishment size moderates this *consumption channel*. Large firms pay systematically higher wages than smaller establishments (Figure 1), so a one–unit increase in tradable employment assigned to a larger–size cell is associated with a larger increase in local purchasing power through earnings per worker. Holding constant the number of local tradable workers, a higher employment share recorded in the large–size cell raises the local wage bill by increasing earnings per worker. On average, large establishments pay wages that are about 60% higher than those of micro establishments (see Figure 1–A)[1]. This large–firm

[1]The large–establishment wage premium we focus on concerns wage levels, not wage growth. While wage increases

FIGURE 1: COMPENSATION OF EMPLOYEES



NOTES. This figure plots employee compensation by establishment size in the manufacturing sector in Italy (extraction activities are excluded from the sample). Panel (A) shows the average level of compensation over the period 2014–2021. Panel (B) shows the evolution of these levels over the same period. Compensation is measured in euros per hour worked.

SOURCE. Authors' elaboration on Istat data.

wage premium raises disposable income, expands local demand for non–tradables, and strengthens the employment response in non–tradable activities. At the same time, however, a higher wage bill per worker also puts upward pressure on the local wage index. This opens the door to offsetting general–equilibrium effects: if local factor costs rise, less productive tradable establishments may lose competitiveness and contract or exit, partly offsetting the positive demand effect associated with large–firm wages.

The sources of the large–firm wage premium have been widely debated. Compensating differentials, the idea that working in large establishments is less desirable and therefore requires higher wages, receive little empirical support (Bloom et al., 2018). A more plausible explanation is rent sharing, whereby large employers share monopoly rents with workers, potentially reinforced by union bargaining or fairness concerns in wage setting. In addition, large establishments face higher monitoring costs, which induces them to select more productive workers and to offer efficiency wages to reduce turnover and increase effort (Krueger & Summers, 1988). Recent evidence suggests that worker fixed effects explain about 20% of the wage premium, while employer fixed effects account for roughly 70%, underscoring the central role of employer characteristics in wage setting (Bloom et al., 2018).

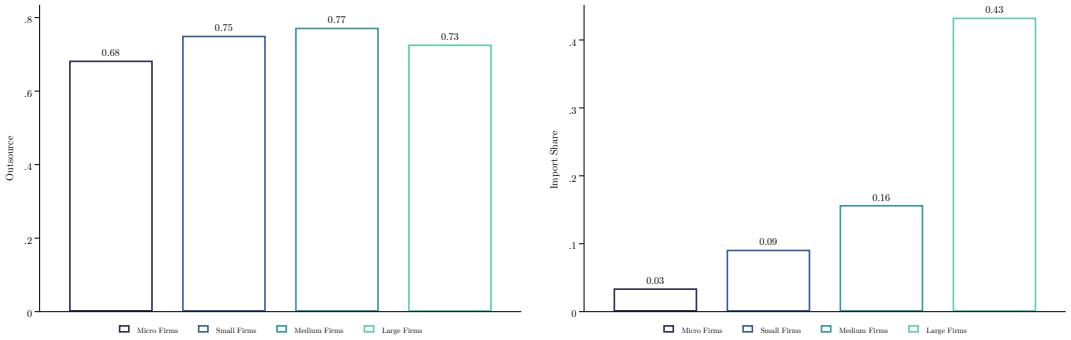
Cost–linkage channel. A second mechanism operates through *cost–linkages* along local supply chains. When local tradable activity expands, it increases demand for intermediate goods and services. If these inputs are sourced locally, the resulting demand generates additional jobs in other tradable activities and business services. This propagation, in turn, raises the local wage bill by increasing the number of tradable workers rather than earnings per worker. Holding constant the local wage index, a larger tradable workforce implies a larger aggregate wage bill to be spent on non–tradable goods and services.

Firm size is again a key determinant of how strongly this channel operates at the local level. Figure 2–(A) plots the ratio of purchases of goods to output by size class. This ratio is relatively similar across size classes, with micro and large establishments showing slightly lower purchase shares, suggesting a higher

were modest over the period we study, the interpretation we emphasize still holds: large establishments systematically pay higher wages than smaller establishments, and these premia are remarkably stable over time.

FIGURE 2: DOMESTIC VS FOREIGN OUTSOURCING

(A) OUTSOURCING (B) IMPORT SHARE



NOTES. This figure plots the outsourcing decisions by size class in the manufacturing sector in Italy (extraction activities are excluded from the sample). Panel (A) shows the ratio of purchases of goods to output, and Panel (B) shows the ratio of purchases of imported goods to total purchases of goods over the period 2015–2019.

SOURCE. Authors' elaboration on Istat data.

degree of internal integration. Figure 2–(B) reports the ratio of purchases of imported goods to total purchases of goods. In this case, the pattern is clear: the share of imported inputs increases sharply with establishment size, indicating that larger establishments rely more heavily on global sourcing.

As a result, large establishments can more easily reduce their dependence on local suppliers. They often internalize production through vertical integration, supported by economies of scale and better access to capital, technology, and managerial expertise (Abraham & Taylor, 1996). They can also outsource to low–wage or specialized suppliers in other regions or countries, so that a substantial portion of the additional demand for intermediates does not translate into local employment gains. By contrast, small establishments are more dependent on local outsourcing. They typically lack the organizational capabilities and specialized equipment needed to produce the full range of intermediates required for final production, and therefore rely on local market transactions to access inputs and services (Bellandi, 1989). Given a similar overall propensity to purchase intermediates, the share of inputs bought from outside the local area increases with establishment size. For smaller establishment–size classes, this implies a stronger reliance on nearby suppliers and stronger cost–linkages within the local economy: employment increases recorded in smaller–size cells may be associated with greater demand for complementary production activities in other local tradable establishments.

Empirical implication. The discussion above yields a clear empirical implication: local employment responses may vary with the size–cell composition of changes in tradable employment. Two margins shape this general–equilibrium response. The first is the *local consumption* channel, which should be more visible in larger establishment cells because higher wages are associated with a larger increase in local purchasing power. At the same time, however, this channel may also trigger offsetting effects on other tradable establishments by putting upward pressure on the local wage index. The second is the *cost–linkage* channel, which should be more visible in smaller establishment cells because smaller establishments rely more heavily on local suppliers.

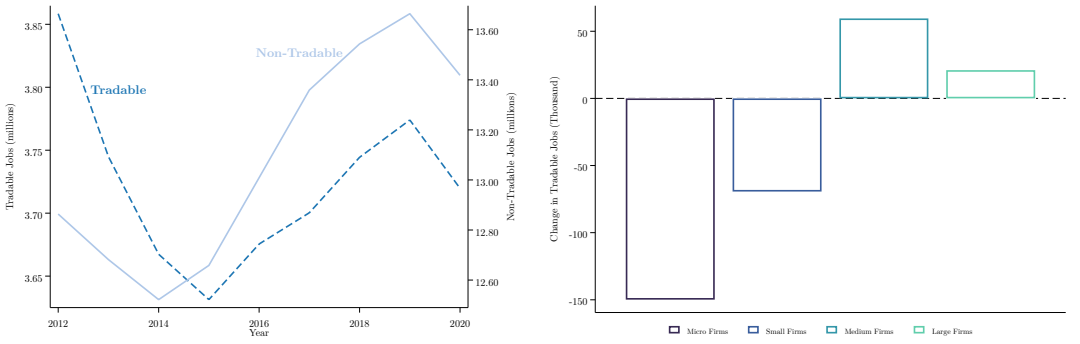
4 Background: the Italian context

Here and in what follows, tradable sectors correspond to the one used in the main literature (Moretti & Thulin, 2013). That is, tradable sectors are defined as extraction (carbon, oil, metals, and related services) and manufacturing (all Ateco 2–digit industries between 05 and 33), while non–tradable sectors include all remaining non–agricultural sectors. This is the conventional identification strategy, which arguably warrants reconsideration in light of the expansion of the service economy. However, Italy's extra–local trade remains predominantly driven by manufacturing, while selected market services, most notably tourism–related activities, have become increasingly important in some local labor markets. Given also the difficulties to measure the contribution of tourism–related activities at the LMAs level, we stick here at the traditional classification[2].

A long literature documents Italy's highly stratified economic geography, which makes the country a natural case study for examining how local economic context shapes employment multipliers. In Italy, between 2012 and 2020, employment in tradable industries declined by about 150 thousand jobs, while employment in non–tradable industries increased by roughly 600 thousand (Figure 3–A). Over this window, non–tradable employment therefore expanded despite the contraction of aggregate tradable employment. This descriptive divergence should be interpreted with care, since the two sectors may follow distinct underlying trends and tend to co–move over longer horizons. Accordingly, the effect of an increase in tradable employment should be understood as the differential response of non–tradable employment relative to its own counterfactual growth path, rather than as an explanation of its overall growth. At the same time, employment within tradable industries was reallocated across contemporaneous establishment–size cells: employment recorded in the medium and large cells expanded, whereas employment recorded in the micro and small cells contracted (Figure 3–B). Taken together, these patterns suggest that the local response to tradable employment may depend not only on its aggregate change, but also on how that change is distributed across establishment–size cells.

FIGURE 3: JOBS IN TRADABLE AND NON–TRADABLE INDUSTRIES DYNAMICS IN ITALY (2012–2020)

(A) TREND (B) TRADABLE COMPOSITION



SOURCE. Our analysis on Istat Asia data.

In order to study local multipliers we refer here to LMAs. They have started to be identified systematically by ISTAT starting from 1981 Census data, also responding to the need to understand the great territorial

[2]Some authors used different approaches; for example, Moretti (2010) and Cerqua and Pellegrini (2020) included only the manufacturing sector, Van Dijk (2018) classified as tradable those industries having a Gini coefficient for spatial concentration higher than a certain threshold (Jensen et al., 2005).

articulation of the Italian economy and society. Three dimensions are central: (i) the North–South divide, with northern regions systematically more productive and richer than southern ones (Buzzacchi et al., 2024); (ii) the urban hierarchy, with distinct trajectories for large urban systems and medium–sized cities, where manufacturing rebounded between 1970 and 1990 (Accetturo et al., 2019); and (iii) the distinction between industrial districts (IDs) and other LMAs. Marshallian districts, introduced by Becattini (Becattini, 1989, 1990), emerged during the crisis of Fordism as more flexible production regimes (Bellandi, 1989), organized around dense networks of establishments specialized by stage (Bellandi, 2009). In this setting, a thick base of small and medium manufacturing establishments sustains external economies and productivity gains (Signorini, 1994).

Over the last decades, technology and globalization have put these arrangements under pressure (Becattini et al., 2009), with effects amplified by two macro shocks: the 2008–2009 global financial crisis (following the collapse of Lehman Brothers) and the 2011 European sovereign debt crisis. The collapse in world demand hit tradable sectors particularly hard (Caivano et al., 2011); growth remained weak thereafter and unemployment rose from 6.1% (2007) to 12.7% (2014)[3], before declining from 2014 onward. This institutional and spatial setting provides a credible context to study how local productive structure mediates the transmission of shocks to employment.

Table 1: The count and size of establishments in tradable industries

	OTHER LMA			INDUSTRIAL DISTRICTS		
	Mean	SD-Between	SD-Within	Mean	SD-Between	SD-Within
	Panel A. Count of tradable establishments					
Average	608.56	1,834.56	83.41	1076.62	1,365.52	72.74
Micro	520.24	1,542.53	81.15	850.02	1,087.30	70.63
Small	74.75	252.85	10.15	193.08	246.42	20.49
Medium	11.87	45.02	2.06	31.00	43.84	3.44
Large	1.70	5.77	0.53	2.52	3.86	0.65
	Panel B. Size of tradable establishments					
Average	6.18	4.23	0.64	9.26	2.53	0.63
Micro	2.36	0.31	0.11	2.81	0.25	0.08
Small	18.26	3.20	1.92	19.17	1.22	0.68
Medium	94.53	25.12	11.79	95.19	15.58	7.71
Large	578.93	359.84	103.83	413.58	150.38	70.28
	Panel C. Tradable employment distribution across establishment sizes					
Micro	0.48	0.24	0.05	0.26	0.08	0.02
Small	0.28	0.10	0.05	0.37	0.07	0.02
Medium	0.16	0.13	0.05	0.28	0.09	0.03
Large	0.09	0.14	0.03	0.08	0.07	0.03

Notes. Micro, small, medium and large refer to the type of establishment according to its size. The 'size of tradable establishments' is calculated by dividing the number of persons employed by the number of establishments in each size class. The table is obtained by aggregating statistics of LMAs distinguishing IDs and other LMAs. The mean value represents the average calculated over the period 2012 to 2020 for each class that is district and other LMAs. The term 'SD-Between' denotes the standard deviation between LMAs in each class (district and other LMAs). The term 'SD-Within' denotes the standard deviation within LMAs (over time) in each class (district and other LMAs). The 'count of tradable establishments' refers to the average number of units in each size class. For example, 1.7 large establishments in other LMAs means that there are 1.7 large establishments in the average LMA belonging to the class of other LMAs. 'Tradable employment distribution across establishment sizes' refers to the ratio of personnel employed in each size class to the total tradable personnel.
Source: Istat Asia Data.

This section uses data on personnel and establishments from the Istat permanent industrial census

[3]Data can be visualized here.

for the period 2012–2020. The data are aggregated at local labor market area (LMAs) and do not allow to capture the sharp decline due to the two subsequent crises. However, they capture the final phase of the decline in employment and entrepreneurship rates. Table 1 presents disaggregated data on the size distribution of establishments in the Italian economy over the period 2012–2020 in tradable sectors. The classification uses four categories based on employment size: micro establishments employing fewer than 10 workers, small establishments with 10 to 49 employees, medium establishments holding between 50 and 249 employees, and large establishments with a workforce exceeding 250. Our aim here is to highlight the structure of the tradable sectors in terms of size distribution and the changes that have taken place over the period 2012–2020.

In general, most of the employment in tradable industries in Italy is accounted for by micro, small and medium–sized establishments $\approx 92\%$ in both IDs and other LMAs. A discrepancy emerges in the role of micro–enterprises, which in IDs employ about half of the personnel employed in other LMAs. This is reflected in the average difference in the size of establishments between IDs (≈ 9.3 persons employed) and other LMAs (≈ 6.2 persons employed). Not only are establishments in IDs larger, but their minimum efficient size is also larger, as evidenced by the standard deviation of establishment size. The 'SD–between', which refers to the standard deviation between LMAs, for the average establishment in IDs is about half that of non–districts and is consistently lower across the size distribution. There are more establishments in the average LMA in IDs for each size class. Among the size classes, the number of small and medium–sized establishments in the IDs is about three times higher than in other LMAs.

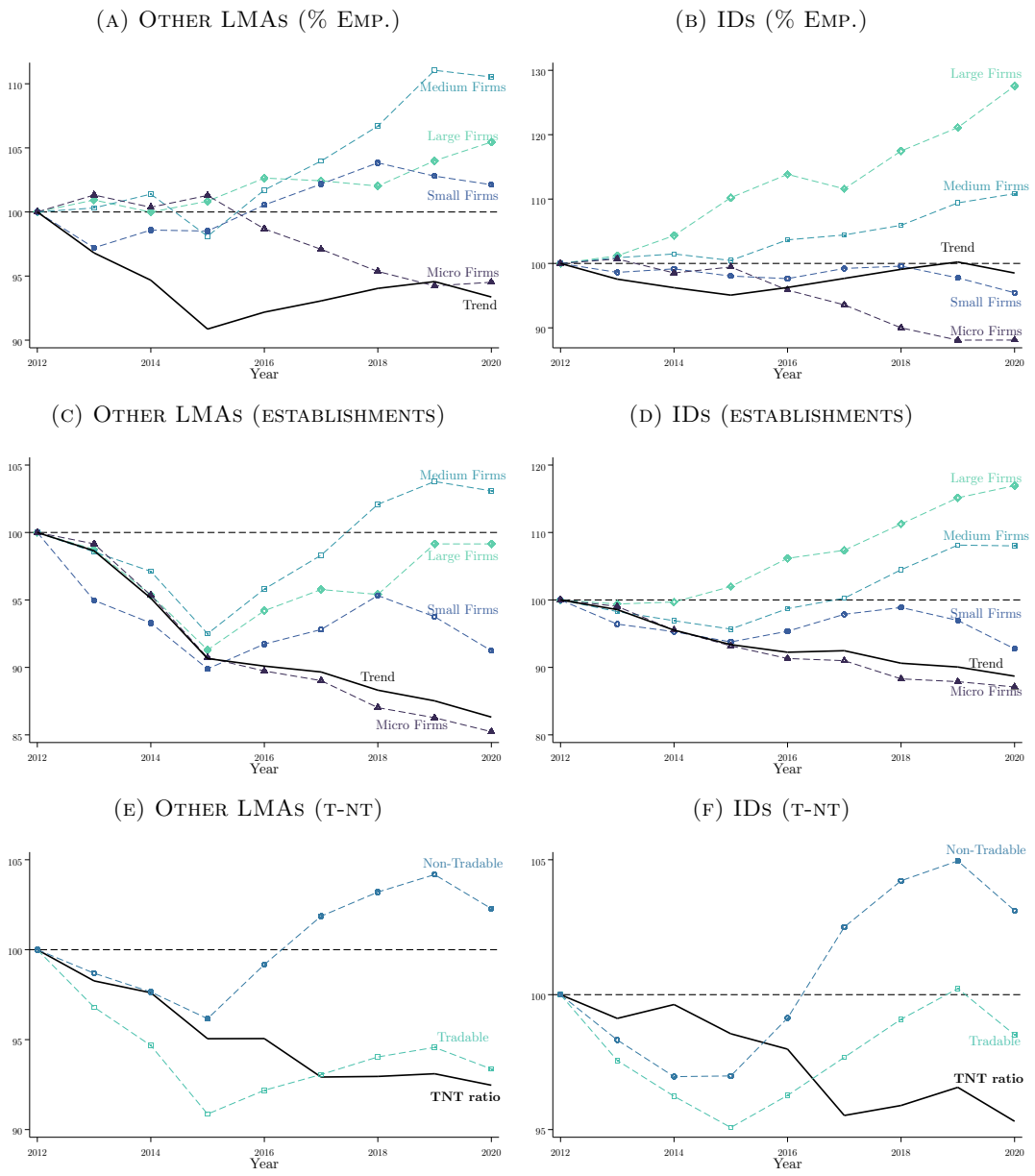
If we look at the dynamics of these variables over the period 2012–2020, a transformation in the structure of the productive systems can be observed. From the figure 4, two main trends are documented:

1. *T–NT trend*, where non–tradable activities increase while tradable activities do not (see Figure 4–e and 4–f)
2. *Compositional shift*. As employment in tradable industries has been lightly decreasing in IDs and decreasing in other LMAs (see Figure 4–e and Figure 4–f), employment has been decreasing in smaller establishments and increasing in larger classes (see Figure 4–a and Figure 4–b), smaller establishments have been decreasing relative to larger classes (see Figure 4–c and Figure 4–d).

Recent literature can help explain this trend. On the one hand, the role of medium–sized establishments within IDs has become increasingly important, and with them the presence of medium–sized establishments. These establishments are often portrayed as the linchpins in the configuration of these districts (Cucculelli & Storai, 2018). In the typical division of labor within districts, while small establishments focus on the production of intermediary goods, medium–sized establishments take charge of marketing outputs to both domestic and international markets (Coltorti & Venanzi, 2017). Due to their superior size and technological capabilities, medium–sized establishments are better positioned to compete on a global scale, thereby assuming a central role in the value chains of district–specific products. On the other hand, the crisis has had a 'cleansing' effect (Caballero & Hammour, 1994), squeezing out less productive establishments. As a result, large and medium–sized establishments survived the recessions and increased their share of employment in the Italian economy and, to a large extent, in IDs.

Over our sample window, employment in tradable industries did not increase, whereas employment in non–tradable industries did. At the same time, tradable employment shifted up the establishment–size distribution, consistent with the 'job ladder' hypothesis (Haltiwanger et al., 2018). This reallocation occurred through a *pouring–out* effect, a movement of jobs from smaller toward larger establishments, as described above.

FIGURE 4: BUSINESS DYNAMICS IN ITALIAN LMAS



NOTES. This figure shows the business dynamics in Italian LMAs, distinguishing between IDs and non–districts. Using this classification, there are 141 IDs and 469 other LMAs. To draw these graphs we use data freely available on the Istat website. Panels (a)–(b) show the evolution of the share of employment accounted for by different size classes of establishments. The panel on the left shows graphs for non–districts, while those on the right show graphs for IDs. Panels (c)–(d) show trends in the number of establishments by size class. Panels (e)–(f) show trends in tradable and non–tradable sectors using employment data. Tradable sectors include extractive and manufacturing activities and is the sum of those employed in these sectors after distinguishing between districts and non–districts. Non–tradable is the sum employees in all remaining non–agricultural sectors. TNT is the ratio of these two measures.

SOURCE. Authors' elaboration on Istat Asia data.

5 Data and econometric design

The main source of data is the Istat dataset at the municipal level, containing information on personnel and establishments covering all non–agricultural activities, four different establishment size classes (micro, small, medium and large), over the period 2012–2020. We pair each municipality with its related LMA, which is a self–contained commuting area, and sum to obtain information at the level of the LMA. In a second step, each 2–digit industry m is categorized as *tradable* (T) or *non–tradable* (NT):

$$T = \{05, 06, \ldots, 33\}, \qquad NT = \mathcal{M} \setminus T$$

For each sector $m \in \mathcal{M}$: $m \in T$ is tradable, $m \in NT$ is non–tradable. We follow Moretti and Thulin (2013) in defining tradable sectors as extraction (carbon, oil, metals, and related services) and manufacturing (all ateco 2–digit industries between 05 and 33), while non–tradable sectors include all remaining industries. Next, we aggregate jobs (e_m) in each LMA, distinguishing sector classification and establishment size for tradable activities.

The Model. Our model estimates how changes in non–tradable employment covary with instrument–induced changes in tradable employment recorded in contemporaneous establishment–size cells. Each regression is identified by the intersection between $r = 610$ regions, $s = 4$ size categories (micro, small, medium and large) and $t = 2012, \ldots, 2020$ year. We identify each region r with an Italian local labor market area (LMA), as described above. Under the interpretations laid out in Section 3, we expect these multipliers to differ across the micro, small, medium, and large cells. To estimate such heterogeneity, we use the stacked structure to obtain separate coefficients for the four size cells. To keep notation compact, all fixed effects are denoted by α, with subscripts indicating the relevant dimension.

We estimate the following stacked model:

$$\Delta e^{NT}_{rt} = \sum_{k=1}^{4} \beta_k \left(\Delta e^{T}_{rst} \times \mathbf{1}\{s = k\} \right) + \alpha_r + \alpha_{R(r)t} + \alpha_{R(r)s} + \alpha_{st} + X'_{rst}\delta + u_{rst}, \tag{1}$$

where

$$\Delta e^{T}_{rst} = e^{T}_{rst} - e^{T}_{rs,t-3},$$
$$\Delta e^{NT}_{rt} = e^{NT}_{rt} - e^{NT}_{r,t-3}$$

This analysis examines three–year changes in employment in non–tradable industries (Δe^{NT}_{rt}), as a function of the three–year change in tradable employment within each size class (Δe^{T}_{rst}). The panel variation supplies the observed changes, while causal interpretation of responses to instrument–induced size–cell employment changes relies on the shift–share instrument and its identifying assumptions. We use three–year intervals to mitigate bias from idiosyncratic annual fluctuations (Appendix B reports sensitivity analysis using different lags). In the stacked sample, each LMA–year outcome Δe^{NT}_{rt} is repeated four times, once for each establishment size class s. The coefficients β_k are therefore size–cell coefficients measuring the non–tradable response associated with changes in employment recorded in each contemporaneous size class. The preferred *full model* corresponds to equation (1) and includes LMA fixed effects (α_r), NUTS–2×year fixed effects ($\alpha_{R(r)t}$), NUTS–2×size fixed effects ($\alpha_{R(r)s}$), and size×year fixed effects (α_{st}). The control vector X_{rst} includes baseline (2011) population, human capital, industrial district status, urbanization, the LMA tradable employment share in 2012, and the size–specific tradable employment share in 2012, each interacted with year indicators. Standard errors are clustered at the LMA×year level to account for serial correlation and for the fact that, in the stacked specification, each LMA–year cell contributes four observations with the same value of Δe^{NT}_{rt} (one for each establishment size class).

Size-class transitions and interpretation. The regressor Δe^T_{rst} measures the change in tradable employment recorded in size class s in LMA r between $t-3$ and t. Let i index establishments, e_{irt} denote establishment employment, and $q_{irt} \in \{1, \ldots, 4\}$ denote the contemporaneous size class of establishment i. Then

$$e^T_{rst} = \sum_{i \in \mathcal{I}^T_{rt}} e_{irt} \mathbf{1}\{q_{irt} = s\}, \qquad \Delta e^T_{rst} = e^T_{rst} - e^T_{rs,t-3},$$

where $\mathcal{I}^T_{rt}$ is the set of tradable establishments observed in LMA r and year t. Thus, Δe^T_{rst} is a change in the stock of employment assigned to size bin s. It is not necessarily the employment change generated by establishments that were already in that size bin at the beginning of the period.

If establishment identifiers were available, this stock change could be decomposed as

$$\Delta e^T_{rst} = G^T_{rst} + M^{T,\text{in}}_{rst} - M^{T,\text{out}}_{rst} + B^T_{rst} - X^T_{rst},$$

where G^T_{rst} denotes employment growth among continuing establishments that remain in size class s, $M^{T,\text{in}}_{rst}$ and $M^{T,\text{out}}_{rst}$ capture employment entering or leaving the cell because continuing establishments cross size thresholds, and B^T_{rst} and X^T_{rst} denote employment associated with births and exits. Since the data are repeated cross–sections and do not contain establishment identifiers, these components cannot be separately observed. For example, an establishment growing from 48 to 55 workers between $t-3$ and t would reduce employment recorded in the small–size cell and increase employment recorded in the medium–size cell, even though the underlying establishment–level employment change is only seven jobs.

This accounting issue is central to the interpretation of equation (1). Under the stated IV assumptions, β_s captures the non–tradable employment response associated with instrument–induced variation in the measured stock of tradable employment assigned to size cell s. We therefore interpret β_s as a size–cell multiplier rather than as the multiplier generated by jobs created in establishments whose initial size was s, or by establishments newly entering size class s. More generally, the estimates capture heterogeneity in local non–tradable employment responses across changes recorded in micro, small, medium, and large cells. Because establishment size is assigned contemporaneously, these cell–level changes may combine employment growth and contraction among establishments remaining in the same class, establishment entry and exit, and movements across size thresholds. The coefficients consequently do not separately identify the contributions of these underlying margins or the causal effect of establishment size per se.

Identification. There are several potential sources of endogeneity that could bias our estimates of β_k. First, establishments self–select their location based on observed and unobserved LMA–specific features such as infrastructure quality, public–goods provision, school performance, and crime rates, which may generate a positive bias if, for instance, better infrastructure attracts both tradable and non–tradable establishments. To purge bias from time–invariant LMA characteristics, we include LMA fixed effects (α_r). Because our identification exploits within–LMA changes over time, we cannot also estimate LMA×year fixed effects. Instead, we control for time–varying factors at the NUTS–2 level such as the opening of new rail lines or airports and region–wide entrepreneurship policies by including NUTS–2×year fixed effects. This approach leverages the fact that each NUTS–2 region contains multiple LMAs. Nonetheless, LMA–year–specific shocks to features remain uncontrolled. We address this concern in the next section.

Second, we address sorting driven by time–invariant, size–specific regional characteristics. Structural features such as persistently differential credit access or historical industrial specialization within certain NUTS–2×size combinations are absorbed by NUTS–2×size fixed effects ($\alpha_{R(r)s}$). Similarly, national policies that affect establishments of particular sizes (e.g., SME incentives) can bias our coefficients if they systematically affect the size of employment in tradable industries as well as jobs in non–tradable industries.

We therefore control for these interventions with size×year fixed effects (α_{st}). Although our dependent variable Δe_{rt}^{NT} is measured at the LMA–year level and does not vary across size classes, including size–class fixed effects sharpens identification by removing residual compositional and trend heterogeneity across the stacked size cells, with minimal efficiency loss.

Our key identification assumption is that conditional on the full set of fixed effects and controls, three–year changes in tradable employment in LMA r and size class s, Δe_{rst}^{T}, are uncorrelated with unobserved shocks to three–year changes in employment in non–tradable industries, u_{rst}. Intuitively, after controlling for time–invariant local characteristics and for region–, size–, and time–specific trends, LMAs that experience larger increases in tradable employment in a given size class do not, on average, face systematically different *unobserved shocks* to employment in non–tradable industries than LMAs with smaller or no employment changes in that size class. For the heterogeneous responses across establishment–size cells, we additionally assume that, conditional on the same set of fixed effects and controls, any unobserved factors that affect employment in non–tradable industries are not systematically related to size–cell changes in tradable employment. Under this assumption, the interaction terms $\Delta e_{rst}^{T} \cdot \mathbf{1}\{s = k\}$ estimate differences in the reduced–form responses associated with instrument–induced changes across size cells. The interpretation remains conditional on the composition of establishments and industries represented in each cell.

Instrumental Variable. Yet, OLS estimates remain inconsistent for two primary reasons. First, unobserved shocks to non–tradable activities may simultaneously affect tradable activities, creating reverse–causality whenever part of the tradable supply chain relies on non–tradable inputs. For instance, the emergence of a local transport hub can confer a comparative advantage to certain tradable industries. If this development is large enough to alter local tradable employment, the estimated effect of tradable employment on non–tradable industries will be biased. Second, LMA–specific labor–supply shocks such as the introduction of new public–transport infrastructure can drive changes in both tradable and employment in non–tradable industries within that LMA. Such shocks raise local labor availability by lowering commuting costs for workers in peripheral areas, who then relocate to job–rich central districts. Because these shocks are narrower than the Nuts–2 region, controlling with a NUTS–2 × year dummy ($\alpha_{R(r)t}$) cannot eliminate the resulting simultaneity bias (Moretti & Thulin, 2013).

Hence, to address endogeneity and estimate the non–tradable response to instrument–induced variation in tradable employment assigned to size cells, we instrument Δe_{rst}^{T} with a leave–one–out shift–share (Bartik) variable (Moretti, 2010; Moretti & Thulin, 2013; Van Dijk, 2017, 2018). The instrument weights national three–year growth in tradable employment by 2–digit industry and size with baseline local employment in those industries, measured in 2012 and held fixed. Intuitively, LMAs that were initially more exposed to industries that subsequently expand nationwide within the same size class are predicted to experience larger increases in tradable employment.

$$z_{rst} = \sum_{m \in T} e_{rms,2012} \left[\ln\left(E_{mst}^{-r}\right) - \ln\left(E_{ms,t-3}^{-r}\right) \right] \tag{2}$$

where

$$E_{mst}^{-r} = \sum_{r' \neq r} e_{r'mst}.$$

As before, the subscript m stands for a generic 2–digit industry. The exposure component $e_{rms,2012}$ is baseline employment in LMA r, industry m, and size class s. The shift component is the three–year log change in national employment in the same industry–size cell, computed excluding the focal LMA ('leave–one–out' as in Goldsmith-Pinkham et al. (2020)). In the heterogeneous IV specifications, the endogenous regressor is Δe_{rst}^{T} and its interactions with size dummies, and the excluded instruments are

z_{rst} and the corresponding size interactions.

The key identification assumption is that, conditional on the full set of fixed effects and controls, the leave–one–out industry– and size–specific shocks embedded in z_{rst} are orthogonal to unobserved shocks to employment in non–tradable industries in LMA r, u_{rst}, and affect Δe_{rt}^{NT} only through their impact on Δe_{rst}^{T}. LMAs that are more exposed to external industry– and size–specific shocks, because of their initial employment composition, do not, on average, experience systematically different unobserved shocks to employment in non–tradable industries than LMAs that are less exposed. Because these national shocks reflect industry–wide demand and policy changes that are exogenous to any single local labor market's unobserved amenities or labor–supply shocks, the instrument induces variation in regional tradable employment that is orthogonal to local confounders and designed to mitigate reverse causality from local shocks (Adao et al., 2019; Broxterman & Larson, 2020; Goldsmith-Pinkham et al., 2020). The four size–specific exposure profiles provide excluded variation; first-stage strength is assessed through the reported diagnostics. In doing so, the shift–share IV isolates exogenous shifts in tradable employment and delivers a causal interpretation for the response to instrument–induced changes in measured size–cell employment, conditional on the relevance and exclusion restrictions. National industry-size shifts may themselves include movements across size thresholds and therefore instrument cell–level employment changes rather than pure establishment–level labor–demand shocks.

6 Main results

This section is divided into two subsections. The initial subsection shows the application of the model described in section 5 with multipliers constrained to be homogeneous across establishment size. The second subsection, which is the core of the econometric results, provides evidence of heterogeneous responses across establishment–size cells.

6.1 Homogeneous Multipliers

Table 2 reports the homogeneous job multiplier when the tradable shock is measured by changes in employment. The coefficient on the change in tradable jobs is constrained to be common across the four size classes in the stacked sample. The table is divided into six columns. Columns (1) and (2) report OLS estimates under increasingly demanding sets of fixed effects and controls. Columns (3) to (6) report Bartik–IV estimates using the instrument discussed in section 5. Column (1) includes LMA, year, and size fixed effects. Column (2) adds NUTS-2 × year, NUTS-2 × size, and size × year fixed effects, together with LMA features and industry composition controls interacted with year. Columns (3) and (4) mirror the more parsimonious and richer fixed-effect structures under IV, while columns (5) and (6) progressively add LMA features and then industry composition controls. For the IV specifications, the first-stage F–statistics are reported in the table.

Column (1) reports the baseline OLS coefficient of the change in tradable jobs on the change in jobs in non–tradable industries. It includes LMA, year, and size fixed effects. The point estimate is 2.23, meaning that an increase of one tradable job is associated with an increase of 2.23 jobs in non–tradable industries in the local labor market. Column (2) adds NUTS-2 × year, NUTS-2 × size, and size × year fixed effects, together with LMA features and industry composition controls interacted with year. This richer specification substantially reduces the OLS coefficient to 0.38. Columns (3) and (4) introduce the Bartik–IV strategy under the more parsimonious and richer fixed effect structures, respectively. The IV estimates are markedly larger, at 5.26 and 5.53, suggesting that OLS may understate the causal effect of tradable employment growth on non–tradable employment. Columns (5) and (6) further add LMA features

TABLE 2: EFFECTS OF A CHANGE IN TRADABLE JOBS ON NON–TRADABLE JOBS, 3–YEARS CHANGE (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ e	2.23***	0.38***	5.26***	5.53***	1.21***	1.26***
	(0.64)	(0.07)	(1.16)	(1.22)	(0.37)	(0.38)
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
R-Squared Within	0.08	0.01				
Observations	14,400	14,184	14,400	14,400	14,400	14,184
1st stage F-Stat.			[62.91]	[51.87]	[34.86]	[33.47]

The dependent variable is the 3–year change in non–tradable jobs. The independent variable is the 3–year local labor market change in tradable jobs, stacked across the 4 size classes and constrained to have a common coefficient across them. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). The 1st stage F–statistics are in square brackets. *** p<.01, ** p<.05, * p<.1.

and then industry composition controls to the IV specifications. The estimated coefficient declines to about 1.2–1.3, but remains positive and statistically significant throughout.

The result in column (6) indicates that, once the richest set of controls is included, an additional tradable job generates an overall increase of 1.26 jobs in non–tradable industries, regardless of establishment size in the homogeneous specification. Relative to the corresponding OLS estimates, the IV coefficient remains substantially larger than the specification with the same set of controls in column (2). This pattern suggests that OLS may understate the causal effect of tradable employment growth on non–tradable employment. One plausible explanation is negative reverse causality from non–tradable to tradable activities. For instance, congestion costs generated by an expansion of non–tradable activities within the local labor market may crowd out tradable employment and bias the OLS coefficient downward. The first–stage F-statistic in column (6) is 33.47, indicating that the instrumental variable has strong predictive power for the endogenous tradable employment shock. Robustness, sensitivity analyses and heterogeneity tests are presented in Appendix A.

6.2 Heterogeneous responses across establishment–size cells

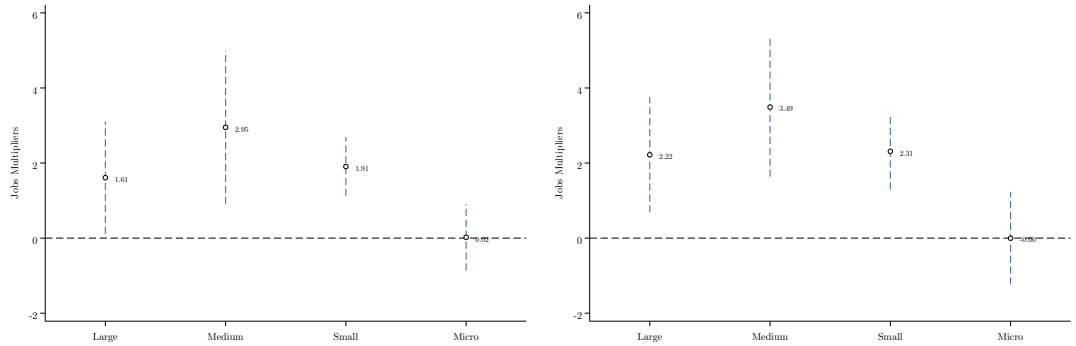
Figure 5–(A) presents the size–cell multipliers (and, as a robustness check, figure 5–(B) reports the same estimates after excluding 2020, the first year of the COVID-19 pandemic in Italy)[4]. Underlying coefficients from Figure 5–(A) are estimated in Table 3 in the appendix, which reports estimates of the model in equation (1). Figure 5 plots the coefficients from the most saturated specification (last column). For each size class, we report one coefficient, namely the jobs multiplier estimated from changes in tradable employment. Altogether, four coefficients are reported, one for each size class.

The estimates point to clear differences across size classes. A one–unit increase in the measured stock of

[4]While year FE are expected to partial–out endogeneity stemming from common trend, the Covid–19 pandemic has been a peculiar shock that locally affected non–tradable and tradable activities differently. As such, we report such a robustness test which show no significant difference with respect to the main specification.

FIGURE 5: SIZE–CELL MULTIPLIERS FOR NON–TRADABLE EMPLOYMENT

(A) FULL SAMPLE (B) EXCLUDING COVID–19



NOTES. The figure plots the size–cell multipliers estimated in Table 3. Panel (A) reports the coefficients from the fully saturated specification (last column), while panel (B) reports the corresponding estimates after excluding 2020, the first year of the Covid–19 pandemic in Italy. Markers denote point estimates and whiskers denote 90% confidence intervals. Standard errors are clustered at the LMA×Year level.

SOURCE. Our analysis on Istat Asia data.

tradable employment assigned to the medium–size cell is associated with a 2.95–unit increase in non–tradable employment. The corresponding size–cell multiplier is 1.91 for the small cell and 1.61 for the large cell, while the micro–cell coefficient is statistically indistinguishable from zero. The estimates are not equally precise, and some uncertainty intervals overlap. Still, in the specification with the full set of controls and fixed effects, the formal test reported in Table 3 rejects joint equality with the large–cell coefficient. Taken together, these results suggest that changes recorded in the medium and small cells are associated with larger non–tradable responses than changes recorded in the micro cell. The ranking across cells may reflect several margins: within–cell employment growth, establishment entry and exit, transitions across thresholds, life–cycle dynamics, and differences in industry composition. The estimates therefore document reduced–form heterogeneity across size cells rather than the causal effect of establishment size per se. Robustness, sensitivity analyses and heterogeneity tests are presented in Appendix A.

7 Evidence Consistent with Potential Mechanisms

This section brings the conceptual framework in Section 3 to the data. In particular, we present two exercises assessing whether the reduced–form heterogeneity is consistent with the two channels. We first study whether changes in tradable employment spread to other local tradable industries, as implied by the *cost–linkage* channel. We then ask whether differences in wages paid across establishment sizes help account for the heterogeneity in tradable–to–non–tradable multipliers, as implied by the *local consumption* channel.

Cost–linkage channel. We first study the *cost–linkage* channel, asking whether changes in tradable employment across size cells are associated with employment growth in other tradable industries. In turn, the effect on other tradable employment reflects into non–tradable employment via a richer wage bill, as described in section 3. We expect these reduced–form propagation coefficients to be smaller than the tradable–to–non–tradable size–cell multipliers and to vary across size cells. Since larger establishments

are more likely to outsource globally or internalize production stages (see Figure 2), localized production linkages may be less visible in the large–cell coefficient and more visible in the medium– and smaller–cell coefficients. Comparing these estimates with those of Section 6 helps assess whether the heterogeneous non–tradable responses are consistent with the *cost–linkage* interpretation.

To examine whether the pattern is consistent with localized production linkages, we depart from the aggregate LMA–level specification used in the main analysis and move to a more disaggregated industry–size design. Rather than aggregating all tradable employment within a local labor market, we retain the 2–digit tradable industry dimension and ask whether local exposure to national employment growth in a focal industry–size cell propagates to other local tradable industries. Accordingly, the object estimated in this section is not the aggregate tradable–to–non–tradable multiplier, but a reduced–form measure of within–tradable propagation: the association between local exposure to external employment growth in industry i and size class s and employment changes in other tradable industries within the same LMA. Because the Bartik exposure measure enters directly, the coefficients should not be interpreted as the number of jobs created per additional focal-industry job. This is the empirical object most closely aligned with the *cost–linkage* mechanism, since it captures whether local exposure to external employment growth in one tradable industry is associated with employment changes in input suppliers and complementary production activities.

Rather than randomly splitting tradable sectors as in Moretti (2010), we use an input–output based decomposition (Gupta, 2020). Let $f_{i\to j}$ denote the flow of intermediate goods from tradable industry i to tradable industry j in the 2010 Italian symmetric input–output table. For each focal industry i, let $T_{-i} \equiv T \setminus \{i\}$ denote the set of all other tradable industries. We define the downstream and upstream shares of partner j as

$$\omega^{D}_{i\to j} = \frac{f_{i\to j}}{\sum_{k\in T_{-i}} f_{i\to k}}, \qquad \omega^{U}_{j\to i} = \frac{f_{j\to i}}{\sum_{k\in T_{-i}} f_{k\to i}}. \tag{3}$$

that is, the shares of i's tradable intermediate sales absorbed by industry j and of i's tradable intermediate purchases sourced from industry j, respectively. We then rank all tradable partners $j \neq i$ separately by $\omega^{D}_{i\to j}$ and $\omega^{U}_{j\to i}$, and define the top–5 downstream and top–5 upstream partners of industry i as the five sectors with the highest shares in each ranking. When the same sector appears in both rankings, we keep it only once in the linked set and sum its two link intensities. We then construct a stacked panel at the local labor market × focal industry × size × year level. Let $\mathcal{L}(i)$ denote the union of these top–5 upstream and downstream partners. The two outcomes are

$$y^{Top5}_{rit} = \sum_{j\in\mathcal{L}(i)} e_{rjt}, \qquad y^{Other}_{rit} = \sum_{j\in T_{-i}\setminus\mathcal{L}(i)} e_{rjt}, \tag{4}$$

where T is the set of tradable industries. We then study the corresponding 3–year changes in these two aggregates.

The tradable shock and its Bartik proxy are both defined at the focal industry × size level. We estimate reduced–form specifications as:

$$\Delta y^{k}_{rist} = \sum_{s} \beta^{k}_{s}\, z_{rist}\mathbf{1}\{s\} + \alpha_{ri} + \alpha_{st} + \alpha_{it} + \alpha_{R(r)t} + \alpha_{R(r)s} + X'_{rist}\delta + \varepsilon_{rist}, \tag{5}$$

where r indexes local labor markets, i focal 2–digit tradable industries, s establishment size classes, and t years. The dependent variable Δy^{k}_{rist} is either the 3–year change in employment in the focal industry's top–5 linked tradable partners (k = Top5) or the 3–year change in employment in all other tradables in the

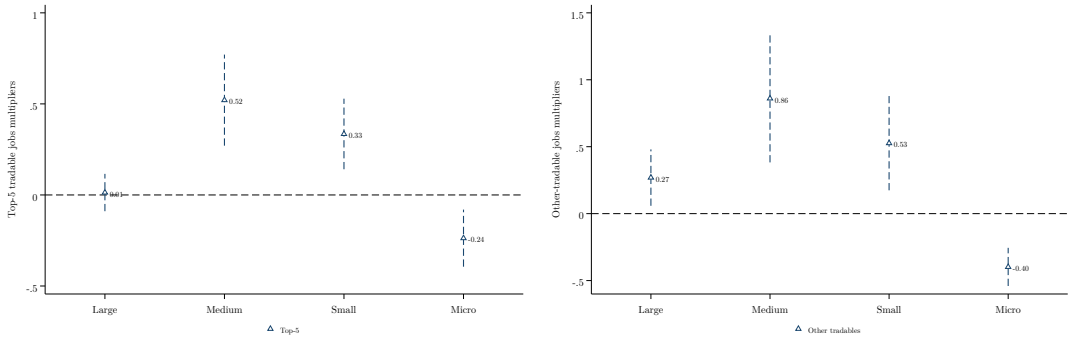
same local labor market, excluding the focal industry itself ($k = \text{Other}$). The Bartik proxy is constructed as

$$z_{rist} = e_{ris0}\left[\ln\left(\sum_{r'\neq r} e_{r'ist}\right) - \ln\left(\sum_{r'\neq r} e_{r'is,t-3}\right)\right], \tag{6}$$

Here e_{ris0} is baseline employment in focal industry i and size class s in local labor market r. The term in brackets measures 3–year national employment growth in the same industry–size cell, computed excluding the focal local labor market. In this more disaggregated setting, we use the Bartik shift–share directly as a measure of local exposure to external demand growth. The measure assigns more weight to local labor markets that were initially more specialized in industry–size cells that subsequently grew at the national level, while excluding their own contribution to that growth. Finally, X_{rist} collects the SLL features and industry–composition controls interacted with year. SLL controls are the same presented in equation (1), while the industry composition controls now reflect the focal share and the focal size share. This design lets us distinguish whether changes in tradable employment recorded in different establishment–size cells are followed mainly by employment growth in closely linked sectors or by a broader response across other tradable industries in the same local labor market.

FIGURE 6: REDUCED–FORM PROPAGATION ACROSS TRADABLE INDUSTRIES

(A) TOP–5 LINKED TRADABLES (B) ALL OTHER TRADABLES



NOTES. Panel (A) plots the size–cell reduced–form coefficients for the 3–year change in employment in the focal industry's top–5 upstream and downstream tradable partners. Panel (B) reports the corresponding coefficients for the 3–year change in employment in all other tradable industries in the same local labor market, excluding the focal industry itself. In both panels, point estimates come from the fully saturated specification described above, using the leave–one–out Bartik proxy defined at the focal industry × size level. Whiskers denote 95% confidence intervals. Standard errors are clustered at the LMA×Year level.

SOURCE. Authors' elaboration on Istat data.

Results are reported in Figure 6. Panel (A) focuses on the focal industry's top–5 linked tradable partners and therefore provides the most direct evidence on whether the pattern is consistent with local production linkages along the value chain. In the fully saturated specification reported in Table 11, the largest positive propagation coefficients are associated with the medium and small cells, at 0.52 and 0.33, respectively, while the large–cell coefficient is close to zero and the micro–cell coefficient is negative. Panel (B) instead considers the broader set of all other tradables in the same local labor market and therefore captures more diffuse propagation effects. The pattern remains similar: exposure associated with medium and small size cells predicts the largest positive changes in linked tradable employment, micro size cells display negative

coefficients, and large size cells show only a small positive effect when statistically significant.

Two results stand out. First, the medium– and small–cell coefficients indicate the strongest reduced–form propagation to other tradable industries, although they remain smaller than the corresponding tradable–to–non–tradable size–cell multipliers. Second, the micro–cell coefficients are consistently negative, while the large–cell coefficients, when statistically significant, indicate only modest positive propagation. This pattern is consistent with limited activation of local employment in other tradable industries when external employment growth is assigned to the large–size cell.

A natural economic interpretation is that large establishments rely less on local production networks. When they expand, a nontrivial share of the additional demand for intermediate inputs is either internalized within the same organization or directed to suppliers located outside the local labor market. In this sense, the tradable–to–other–tradable estimates provide evidence consistent with localized production linkages being most visible in the medium and small cells and comparatively weak in the large cell; the negative micro–cell coefficient may also reflect displacement or compositional adjustment. We return to these implications in greater detail in Section 8.

Local consumption channel. To assess whether the pattern is consistent with the *local consumption* channel, we move away from the unrestricted multiplier estimates and impose a simple wage–based restriction on the data. The idea is that, if part of the tradable–to–non–tradable response operates through local consumption, then fitted size–cell coefficients should be larger for cells with higher wages, for a given increase in tradable employment. Accordingly, rather than estimating four fully flexible size–cell multipliers, we assess whether the observed heterogeneity can be organized by a common relationship between wages and local multipliers. This section therefore estimates a restricted version of the main specification, designed to assess whether differences in wages across establishment–size cells organize part of the heterogeneous tradable–to–non–tradable pattern; it does not causally identify the local consumption channel.

To operationalize the *local consumption* channel, we combine the heterogeneous multiplier design in Table 3 with baseline hourly wages from the Istat wage microdata[5]. The underlying idea is that what matters for non–tradable employment is not only the change in tradable employment recorded in each size cell, but also the income per worker associated with that cell. Let w_{is} denote average hourly gross pay in 2014 for tradable industry i and size class s, and let $e_{is,2014}$ denote national tradable employment in the same cell. We then construct one baseline wage for each size class as the employment–weighted average

$$\bar{w}_s = \frac{\sum_{i \in T} e_{is,2014} w_{is}}{\sum_{i \in T} e_{is,2014}}. \tag{7}$$

We then re–estimate the heterogeneous IV model imposing that size–cell multipliers are a linear function of these class–level wages. Instead of estimating four unrestricted coefficients, we estimate

$$\Delta e^{NT}_{rt} = \beta_0 \Delta e^{T}_{rst} + \beta_1 \left(\Delta e^{T}_{rst} \times \bar{w}_s \right) + \alpha_r + \alpha_{R(r)t} + \alpha_{R(r)s} + \alpha_{st} + X'_{rst}\delta + u_{rst}, \tag{8}$$

instrumenting Δe^{T}_{rst} and $\Delta e^{T}_{rst} \times \bar{w}_s$ with z_{rst} and $z_{rst} \times \bar{w}_s$. This specification mirrors equation (1) in its set of fixed effects and control variables. Relative to the main specification in Table 3, the unrestricted set of four size coefficients is thus replaced by the restriction

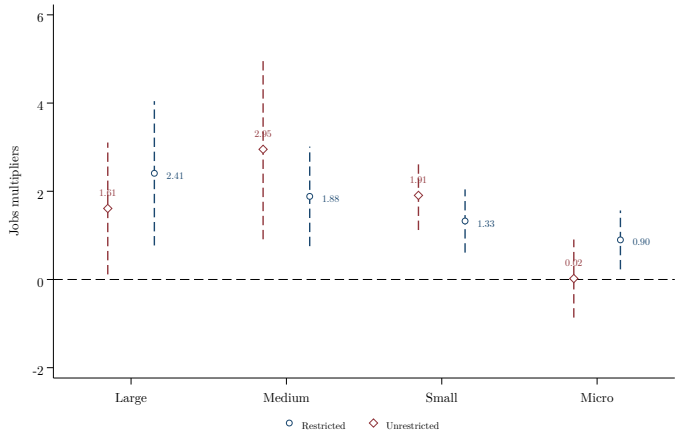
$$\beta_s = \beta_0 + \beta_1 \bar{w}_s. \tag{9}$$

Appendix Table 10 reports the full regression table, while Figure 7 plots the fitted size–cell multipliers from

[5]Data are available in the Istat website.

the fully saturated IV specification.

FIGURE 7: DEMAND-CHANNEL RESTRICTION: TRADABLE ON NON–TRADABLE MULTIPLIERS



NOTES. The figure plots the fitted size–cell coefficients implied by the fully saturated wage–restricted IV specification reported in column (6) of Appendix Table 10. The underlying regression constrains size–cell multipliers to lie on a common line in the baseline hourly wage of each size class. Markers denote point estimates and whiskers denote 90% confidence intervals. Standard errors are clustered at the LMA×Year level.

SOURCE. Authors' elaboration on Istat data.

The results are consistent with the consumption–channel logic developed in the conceptual framework. If the local demand response depends in part on the wage bill associated with a one–unit increase in tradable employment, then size cells with higher baseline wages should display larger fitted tradable–to–non–tradable coefficients. This is exactly the pattern we find: the fitted coefficient rises monotonically with class–level wages, from 0.90 for the micro cell to 1.33 for the small cell, 1.88 for the medium cell, and 2.41 for the large cell. In this sense, the wage restriction organizes the heterogeneity in a way that is consistent with the local consumption channel, but it does not identify that channel causally.

8 Discussion

Our results should be interpreted through the lens of general equilibrium. Size–cell multipliers are reduced–form equilibrium outcomes: they summarize the net adjustment triggered by a tradable employment shock, rather than isolating any single causal mechanism. Accordingly, the tradable–to–non–tradable multiplier combines the local consumption channel, cost–linkages, crowding–out on other tradables, and adjustment through local wages, rents, and quantities. Because establishment size is assigned contemporaneously, each cell–level employment change may also combine growth or contraction within the bin, establishment entry and exit, and transitions across size thresholds. This perspective helps organize the main findings.

In the unrestricted specification, the medium–cell coefficient is the largest tradable–to–non–tradable size–cell multiplier (2.95), followed by the small–cell (1.91) and large–cell (1.61) coefficients, while the micro–cell coefficient is statistically indistinguishable from zero. A smaller reduced–form coefficient for the large cell should therefore not be read as evidence against the local consumption channel. Rather, the pattern is consistent with the positive demand impulse associated with higher wages in larger establishments

being attenuated by stronger equilibrium adjustment through prices and by weaker local production linkages.

The tradable–to–other–tradable results are particularly informative about these attenuating forces. We find positive reduced–form propagation coefficients only for the small and medium cells, while the large–cell estimates are close to zero and the micro–cell estimates are negative. This pattern is consistent with stronger local cost–linkages among small and medium establishments, which rely more heavily on local outsourcing and are therefore more embedded in local production networks (see Figure 2).

The negative micro–cell propagation coefficient can be rationalized by two complementary interpretations, neither of which is separately identified. First, micro establishments often operate at very small scale and source standardized inputs through extra–local wholesalers rather than local intermediate suppliers, mechanically weakening local cost–linkages. Second, high turnover and intense within–segment competition may generate displacement: entry or expansion among micro establishments may come partly at the expense of other micro producers, reducing their scale and employment, so that the net increase in upstream input demand, and hence in other tradable jobs, is close to zero or negative. Consistent with both mechanisms, a nontrivial share of micro tradable establishments corresponds to artisan producers purchasing inputs from wholesale traders and subcontractors operating at the bottom of local value chains, whose input demand is largely pinned down by upstream contractors.

For large establishments, a natural explanation instead relies on sourcing and organizational choices. Large establishments tend to be more vertically integrated and, when they outsource, they rely more heavily on global value chains for intermediate inputs. This can weaken the extent to which employment growth recorded in the large–size cell is associated with employment growth in other local tradable establishments. A second mechanism works through local prices. Entry or expansion among large establishments may raise local wages and rents, thereby limiting the extent to which other establishments can benefit from agglomeration economies. Higher labor and land costs reduce competitiveness in tradable activities, whose output prices are largely determined outside the local economy. As a result, non–large establishments facing higher local costs may scale back expansion locally or relocate production to other areas, a pattern consistent with weaker local propagation associated with the large–size cell.

Taken together, the evidence points to a simple equilibrium interpretation. The wage–restricted pattern for the larger cells is consistent with a stronger wage–based local consumption channel, but this does not translate one–for–one into larger unrestricted non–tradable coefficients because the same cells are also associated with weaker local production linkages and plausibly stronger crowding–out through local factor prices. In this sense, the large–cell result is not a contradiction: it indicates that wage premia can help organize the reduced–form heterogeneity, but do not exhaust the equilibrium response or identify a causal channel.

Local economic context. Unlike the discussion above on consumption and cost–linkage channels, the role of local economic context is necessarily more tentative, because here we do not have a direct empirical test of the underlying mechanisms. The patterns below should therefore be read as suggestive interpretations consistent with the evidence, rather than as separately identified causal channels.

When multipliers are constrained to be homogeneous across establishment sizes, we find positive tradable–to–non–tradable effects in the North, no significant effects in the Center, and negative effects in the South. A plausible interpretation is that the same national tradable disturbance may trigger different local responses because our demand shocks are built from a common national component. LMAs with similar industrial structures are therefore exposed to positively correlated shocks over time, even if with different intensities. In the North, where local labor markets are more attractive and in–migration is stronger, positive tradable shocks are more likely to be accommodated through quantities, generating a larger non–tradable response. In the South, by contrast, the same shock may induce weaker local adjustment if workers interpret it as

part of a broader national expansion that raises opportunities in northern LMAs, so that out–migration partly offsets the local demand effect (Calcagnini et al., 2021).

We also find larger multipliers in large cities than in medium and other LMAs. This pattern is consistent with larger urban labor markets being better able to absorb tradable shocks through employment rather than local bottlenecks. If local labor supply is more elastic in larger cities, owing to stronger in–migration and thicker labor markets, the same tradable shock is more likely to translate into additional non–tradable jobs rather than into offsetting adjustment.

Finally, multipliers are lower in industrial districts than in other LMAs. A natural interpretation is that, in districts, local production linkages are already dense and highly exploited, so that the marginal outsourcing effect of an additional tradable job is weaker. The size–cell estimates are consistent with this view. Outside districts, positive tradable–to–non–tradable coefficients are concentrated in the small and large cells; within districts, they are concentrated in the small and especially medium cells (see Figure 10). This pattern is consistent with the idea that medium establishments are deeply rooted in district economies and increasingly occupy higher–value–added segments of local value chains (Coltorti & Venanzi, 2017; Cucculelli & Storai, 2018). It also reinforces the descriptive evidence in Section 4, where medium establishments emerge as central actors in the recent restructuring of industrial districts. This suggests that industrial districts do not uniformly amplify local multipliers. Rather, they appear to favor propagation through the size classes that are more tightly embedded in district production networks, while the weaker large–cell coefficient within IDs is consistent with large establishments being less embedded and more reliant on internal organization or extra–local sourcing (Bellandi, 2001; Bellandi & De Propris, 2012).

9 Concluding remarks

This paper examines whether local employment responses vary with the establishment–size cell in which changes in tradable employment are recorded. This is a policy–relevant question because the size composition of local production features prominently in debates over support for small and medium enterprises (SMEs) and the attraction of large establishments. Following the logic of Kazekami (2017), Moretti (2010), Moretti and Thulin (2013), and Van Dijk (2017), we argue that a potential source of heterogeneity in local multipliers is the size composition of tradable industries. According to our conceptual framework, a persistent change in tradable employment may be associated with different responses in non–tradable industries depending on how that change is distributed across establishment–size cells.

Using local variation in tradable and non–tradable activities, we estimate several specifications of the local multiplier. First, we connect our estimates to previous literature by obtaining a positive size–constrained homogeneous local multiplier of 1.26 in our preferred specification. Second, our main findings point to heterogeneous responses across establishment–size cells. The size–cell multipliers equal 1.61 for the large cell, 2.95 for the medium cell, and 1.91 for the small cell, while the micro–cell coefficient is statistically indistinguishable from zero.

We offer an interpretation of this result with two mechanisms–informed exercises. In our conceptual framework, two distinct demand channels can propagate changes in tradable employment to non–tradable employment: (i) the *local consumption* channel, and (ii) the *cost–linkage* channel. Higher wages in larger establishment cells are consistent with a stronger local consumption response through income per worker, while the propagation coefficients associated with smaller cells are consistent with denser local production linkages and a larger number of local tradable workers. These two channels can reinforce one another, but their combined effect is filtered by general–equilibrium adjustment through local wages, rents, labor supply, and housing supply, so aggregate multipliers can mask important size–cell heterogeneity.

We assess whether the pattern is consistent with the *local consumption* channel by imposing a wage–based restriction on the main specification, allowing fitted tradable–to–non–tradable coefficients to vary systematically with the wages paid in different establishment–size cells. The wage restriction organizes the heterogeneity in a manner consistent with the local consumption channel: the fitted coefficients increase monotonically with establishment size. The large cell displays the highest fitted coefficient (2.41), while the micro cell displays the lowest (0); this exercise does not causally identify the channel.

We also assess whether the pattern is consistent with the *cost–linkage* channel using a revised version of the approach in Moretti (2010). Specifically, we estimate reduced–form propagation coefficients from focal tradable industry–size cells to other tradable industries. We distinguish between: (i) the top–5 linked industries, defined as the five 2–digit industries with the highest input–output coefficients relative to each focal industry, and (ii) all other tradable industries. The results point to an inverted–U pattern across establishment–size cells. The medium–cell propagation coefficient is the largest, followed by the small–cell coefficient. The large–cell coefficients are close to zero, while the micro–cell coefficients are negative, providing evidence consistent with localized production linkages rather than a causal estimate of a channel.

Interpretive limitation. Our analysis is subject to one important limitation. The estimates do not imply that changing establishment size per se would causally alter the local multiplier, nor do they identify the relative effects of policies aimed at attracting large establishments versus supporting networks of small and medium establishments. This caution follows directly from the contemporaneous assignment of establishments to size classes. Employment changes recorded in each size cell may combine growth or contraction among establishments remaining within the class, establishment entry and exit, and movements across size thresholds. The size–cell composition of tradable employment changes therefore provides a meaningful way to organize reduced–form heterogeneity in local responses, but it does not separately identify the causal contribution of establishment size or of the underlying margins generating those changes. We maintain this interpretation throughout the paper.

Policy implications. Subject to this interpretive limitation, our findings suggest that the local consequences of tradable employment growth may depend not only on where that growth occurs, but also on how it is distributed across establishment–size cells. This perspective is potentially relevant for local development policy because strategies aimed at attracting large establishments and those supporting networks of small and medium enterprises may operate through different local margins. Our estimates do not establish the relative causal effectiveness of these strategies, but they indicate that the size composition of tradable employment changes may be informative when evaluating their possible local consequences.

One possible implication concerns space–blind policy. If the objective is to favor combinations associated with stronger employment propagation, the results point to changes concentrated in medium–size cells and in larger urban economies. This should not be interpreted as evidence that directly targeting medium establishments is necessarily optimal, since the estimated medium–cell coefficient may also reflect establishment dynamics, threshold transitions, and sectoral composition. Rather, it suggests that the conditions associated with the expansion of the medium–size segment may be relevant for the transmission of tradable growth to the rest of the local economy. Under a space–blind approach, aggregate gains could then be redistributed toward lagging regions through the fiscal system (Boldrin & Canova, 2001).

A second possible implication is place–based, or space–sensitive. If the objective is to strengthen employment propagation in weaker local economies, the results point to the potential importance of the conditions supporting both local purchasing power and localized production linkages. Relevant policy margins may include human–capital interventions that raise productivity and wages across establishments,

technology–transfer and innovation policies that upgrade local supply chains, and investments that strengthen territorial networks connecting smaller local economies to nearby urban centers (Barca et al., 2012). These policies should be understood as possible margins suggested by the mechanisms considered in the paper, rather than as interventions whose causal effectiveness is directly identified by our estimates.

Overall, the evidence suggests that changes recorded in different establishment–size cells are associated with differences in both the magnitude and the apparent channels of local employment propagation. Changes concentrated in larger–size cells are more consistent with a stronger income–per–worker and local–consumption margin, whereas changes concentrated in small and medium cells are more consistent with localized production linkages and employment growth along the value chain. The policy relevance of these patterns therefore lies less in identifying a single establishment size to target than in highlighting a potential trade–off between favoring combinations associated with stronger aggregate employment propagation and strengthening the local mechanisms through which tradable growth reaches lagging economies.

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Data availability. The data used in this study are produced by the Italian National Institute of Statistics (Istat) and are available from Istat.

Use of generative AI. The authors used a large language model to assist in writing Stata code for data processing and estimation, and for language editing of the manuscript. All code was reviewed, run, and validated by the authors, and the authors take full responsibility for the content of the article.

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A Additional Results

In this appendix we present a brief description of further robustness tests and heterogeneity analyses.

Alternative Wide–Format Specification. Table 4 assesses whether the results are sensitive to estimating the four size–specific employment changes jointly in a wide–format specification. Panel A confirms that the homogeneous multiplier remains positive and precisely estimated across all IV specifications. The heterogeneous estimates in Panel B require greater caution, as the first stages are relatively weak, particularly for the medium–size cell, and the equality tests do not reject a common coefficient across size cells in the most saturated specifications. Nevertheless, once baseline local characteristics and industry composition are allowed to generate differential time trends, the medium–cell coefficient remains the largest positive estimate and is marginally statistically significant, whereas the coefficients for the other size cells are statistically indistinguishable from zero. Thus, although the limited first–stage strength prevents a precise interpretation of the magnitude and of the differences across size cells, the persistence of the positive medium–cell coefficient provides qualitative evidence that the baseline pattern is not driven solely by the stacked specification.

Robustness Tests. Table 9 reports a placebo exercise designed to assess whether our results are driven mechanically by the exposure structure of the Bartik instrument rather than by the timing of the national shift. Specifically, we instrument size–specific changes in tradable employment using a three–year lead of the national shift, instead of the observed contemporaneous shift. Under a valid identification strategy, this placebo instrument should have no predictive content for current changes in non–tradable employment, since future national shocks should not affect current local labor market outcomes.

Across all establishment–size classes, the estimated coefficients are statistically indistinguishable from zero. This result provides reassurance that our baseline estimates are not mechanically generated by the exposure component of the instrument alone. Rather, identification appears to come from the interaction between local exposure and contemporaneous national industry–size shocks, as intended by the design.

The sample falls to 7,092 observations because using a lead substantially reduces the available overlap between lead and lag windows. In practice, once future national shifts are matched with current local outcomes, only a three–year common support remains in the panel.

Sensitivity Analysis. Figure 8 reports both robustness exercises in a single two–panel graph. Panel (A) refers to the homogeneous specification, while panel (B) reports the heterogeneous specification. Panel (A) evaluates the sensitivity of the homogeneous model to alternative differencing horizons, using 2–, 3–, 4–, and 5–year employment changes. The estimated multipliers vary with the horizon and tend to attenuate at longer lags. A natural interpretation is that general–equilibrium adjustment unfolds gradually over time, so that part of the initial local response is reabsorbed as wages, rents, and employment reallocate across places and sectors (see Moretti, 2010).

Panel (B) reports the corresponding heterogeneous IV estimates. Here, the dynamic pattern differs markedly across establishment–size cells. The large–cell coefficient follows an inverted–U profile, the medium– and micro–cell coefficients decline with the length of the differencing horizon, while the small–cell coefficient increases over time. This latter pattern is suggestive of dynamic agglomeration effects, whereby employment growth recorded in the small tradable cell today is associated with stronger subsequent local spillovers (Glaeser et al., 2015). More generally, the sensitivity analysis indicates that both the magnitude and the composition of local multipliers depend on the horizon over which adjustment is measured.

Local Economic Context. Due to institutional and productive differences across places, local employment effects may vary with local economic context. We therefore allow multipliers to differ along three dimensions: (i) the four main macro–areas of Italy (North–East, North–West, Center, and South, Figure 9–A), (ii) industrial districts versus other LMAs (Figure 9–B), and (iii) three categories of city size (large, medium, and other LMAs, Figure 9–C). The underlying hypothesis is that local labor supply responds differently to shifts in labor demand across these environments. Where the local labor supply response to a given tradable shock is stronger, we expect a larger expansion in jobs in non–tradable industries.

Industrial districts are socio–territorial entities made up of a community of establishments and people linked not only by their shared location but also by the socio–economic ties that arise from it. The establishments are predominantly small and medium–sized, belong mainly to the same industry, and collectively define the district's core economic activity. Industrial districts are identified by Istat following the work of Becattini (1989) and Sforzi et al. (1991). Large cities correspond to the municipal administrative unit, and LMAs are those within which such a center is located[6], the same for medium–sized citites. 'Other LMAs' refer to two sets of residual categories across the two specifications discussed above, capturing all LMAs that are not industrial districts or large/medium cities. Finally, the four main macro areas (North–East, North–West, Center, and South) follow the standard Istat classification and are commonly used in studies of the Italian economy (Cerqua & Pellegrini, 2020; De Blasio & Menon, 2011).

Figure 9 reports the estimated coefficients across different local economic contexts. In Figure 9 we systematically plot the coefficients from the fully saturated specification. Appendix Tables 5, 6, and 7 report the corresponding regression estimates for macro–areas, agglomeration type, and city size. Overall, the evidence shows that employment multipliers differ across local economic contexts.

Across macro–areas, estimated multipliers are positive in the North–East and North–West, statistically indistinguishable from zero in the Center, and negative and statistically significant in Southern Italy. In the North, where local labor markets are more attractive and in–migration is stronger, positive tradable shocks are more likely to be accommodated through quantities, thereby generating a larger non–tradable employment response. A given increase in labor demand in tradable activities can be met by an inflow of workers from other areas, which limits upward pressure on local wages and allows the shock to translate into a broader expansion of local employment. In the South, by contrast, the same shock may generate a weaker local response. Because our shift–share design is built on a common national component, positive local shocks are plausibly interpreted by workers as part of a broader national expansion rather than as an idiosyncratic improvement in local opportunities. If northern LMAs remain more attractive destinations, part of the adjustment may take the form of out–migration rather than local employment growth. Under this interpretation, the positive labor–demand effect is partly offset by the relocation of workers toward more dynamic northern areas, weakening the increase in local demand for non–tradable goods and services and, in turn, the local multiplier (Calcagnini et al., 2021).

For industrial districts versus other LMAs, coefficients are lower in IDs. District establishments operate within a finely articulated local division of labor, characterized by thick and stable input–output relationships across specialized producers. In such a setting, the gains from local fragmentation and supplier proximity may already be largely internalized in the existing organization of production. Consequently, an additional tradable job may increase the utilization of established local linkages without generating much new demand for additional local suppliers. The result is a weaker employment response in other tradable establishments at the margin, even though the district economy remains highly interconnected in levels. On this view, lower multipliers in districts reflect a form of marginal saturation of local production linkages rather than a weaker underlying network structure.

[6]The classification follows that of Istat; see the methodological notes available here.

For city size, large cities display larger multipliers, consistent with the idea that denser labor markets can absorb tradable demand shocks more effectively (see Kazekami, 2017). A plausible interpretation is that larger urban areas feature thicker labor markets and more elastic local labor supply, owing to stronger matching capacity and greater in–migration. In such settings, a positive tradable shock can be accommodated more through employment expansion and less through local price adjustment. This implies that the increase in income generated by tradable job creation is more likely to spill over into additional demand for non–tradable goods and services, thereby producing a larger local multiplier. By contrast, in smaller local labor markets, tighter labor supply and local bottlenecks may absorb a larger share of the shock through wages and rents, weakening the employment response.

Spatial and Size Heterogeneity. Figure 10 examines whether tradable–to–non–tradable multipliers vary jointly by agglomeration type (IDs vs. Other LMAs) and establishment size class. For ease of interpretation, we report the estimates graphically. Estimation results are presented also in table 8. The results show that the small–cell coefficient is positive both inside and outside IDs, while the micro–cell coefficient is statistically indistinguishable from zero in both settings. The main heterogeneity arises in the medium– and large–cell coefficients. The medium–cell coefficient is larger in IDs and statistically indistinguishable from zero in other LMAs, whereas the large–cell coefficient displays the opposite pattern: it is positive in other LMAs and statistically indistinguishable from zero within IDs.

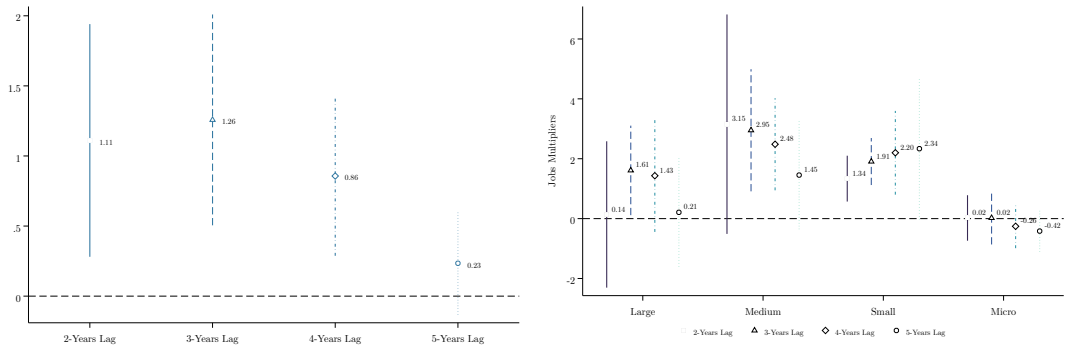
This configuration is consistent with the organization of production in industrial districts. In IDs, the larger medium–cell coefficient is consistent with medium establishments acting as central nodes in a decentralized division of labor, coordinating local suppliers and fostering external economies at the district level (Cucculelli & Storai, 2018). Employment changes recorded in that cell may therefore propagate more strongly through existing district production networks and be associated with additional local employment in non–tradable activities. The weaker large–cell coefficient is consistent with large establishments being less embedded in these networks and more likely to internalize production stages or rely on extra–local sourcing. This may limit local propagation associated with the large cell within IDs, where the scope for additional local propagation may already be limited (Bellandi, 2001).

More broadly, these results suggest that industrial districts do not uniformly amplify local multipliers. Rather, they appear to favor propagation through the size classes that are more tightly integrated into district production networks. Once heterogeneity across establishment–size cells is taken into account, agglomeration type matters less in itself than whether employment changes are recorded in cells whose typical organizational features are aligned with the local structure of production.

B Figures

FIGURE 8: ALTERNATIVE DIFFERENCING HORIZONS (2–, 3–, 4–, AND 5–YEAR CHANGES)

(A) HOMOGENEOUS MULTIPLIERS (B) SIZE–CELL MULTIPLIERS

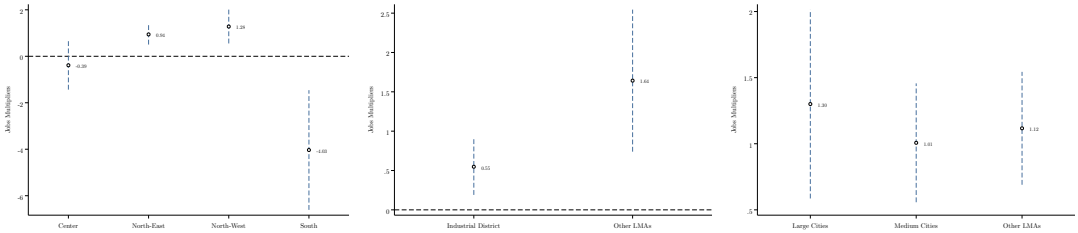


NOTES. The figure plots IV estimates obtained with alternative differencing horizons. Panel (A) reports the homogeneous job multiplier implied by the specification in Table 2; panel (B) reports the size–cell multipliers implied by the fully saturated heterogeneous specification in Table 3. In each case, both the endogenous tradable employment change and the corresponding shift–share instrument are reconstructed using the relevant lag length. Point estimates are labelled, whiskers denote 95% confidence intervals, and standard errors are clustered at the LMA×year level.

SOURCE. Our analysis on Istat Asia data.

FIGURE 9: HETEROGENEOUS MULTIPLIERS BY GEOGRAPHY

(A) NORTH–SOUTH (B) INDUSTRIAL DISTRICTS (C) CITY SIZE

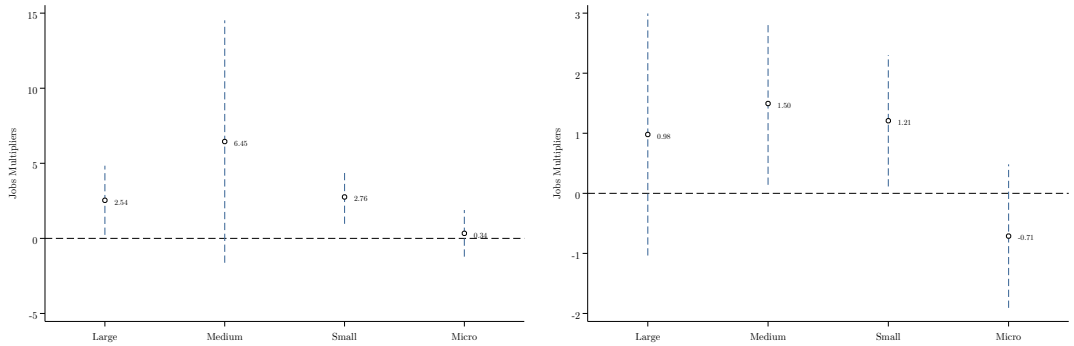


NOTES. Each panel reports only the employment multiplier coefficients from the fully saturated specification. Circles indicate point estimates (with coefficient labels), and whiskers show 90% confidence intervals. Standard Errors are clustered at the LMA×Year level.

SOURCE. Authors' elaboration on Istat data.

FIGURE 10: SIZE–CELL MULTIPLIERS BY AGGLOMERATION TYPE

(A) OTHER LMAS (B) INDUSTRIAL DISTRICTS



NOTES. Each panel reports only the employment multiplier coefficients from the fully saturated specification. Circles indicate point estimates (with coefficient labels), and whiskers show 90% confidence intervals. Standard Errors are clustered at the LMA×Year level.

SOURCE. Our analysis on Istat Asia data.

C Tables

Table 3: Size–Cell Multipliers for Non–tradable Employment, 3–year Changes (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Large	1.37	0.12	6.28***	6.12***	1.45*	1.61*
	(0.88)	(0.14)	(2.02)	(2.08)	(0.87)	(0.91)
1st stage F-Stat.			[58.45]	[57.99]	[38.51]	[33.02]
Δ Medium	2.19***	0.53***	5.23**	5.82**	2.77**	2.95**
	(0.61)	(0.10)	(2.44)	(2.85)	(1.14)	(1.24)
1st stage F-Stat.			[53.10]	[42.22]	[17.23]	[14.77]
Δ Micro	1.97**	0.55***	1.63	1.70	0.05	0.02
	(0.88)	(0.17)	(1.72)	(1.86)	(0.50)	(0.54)
1st stage F-Stat.			[246.80]	[218.87]	[128.61]	[109.80]
Δ Small	3.38***	0.48***	8.22***	8.72***	1.81***	1.91***
	(0.80)	(0.14)	(0.78)	(0.94)	(0.45)	(0.48)
1st stage F-Stat.			[133.62]	[117.28]	[56.87]	[52.70]
P-value: Joint equality with Large	0.052	0.116	0.000	0.001	0.023	0.030
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non–tradable jobs. The independent variables are the 3–year local labor market changes in tradable employment assigned to contemporaneous establishment–size cells. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). The 1st stage F–statistics are in square brackets. Coefficients are size–cell marginal effects from margins over size classes, with the micro cell as the omitted category in the underlying interacted specification. The row 'P-value: Joint equality with Large' reports the p–value of the null hypothesis that the medium–, micro–, and small–cell coefficients are jointly equal to the large–cell coefficient. *** p<.01, ** p<.05, * p<.1.

Table 4: Homogeneous and Size–Cell Multipliers in Wide Format, 3–year Changes (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Homogeneous multiplier					
Δ Tradable jobs	2.31***	0.92***	2.88***	2.92***	2.04***	2.14***
	(0.36)	(0.17)	(0.32)	(0.33)	(0.51)	(0.52)
1st stage F-Stat.			[173.43]	[156.21]	[79.55]	[75.51]
	Panel B. Four simultaneous size–class regressors					
Δ Large	1.05	0.57**	-3.12	-3.86	2.06	2.27
	(0.79)	(0.27)	(4.11)	(4.30)	(1.68)	(1.65)
1st stage F-Stat.			[9.02]	[9.38]	[19.45]	[24.84]
Δ Medium	2.17***	1.08***	-7.22	-7.89	6.33*	6.59*
	(0.59)	(0.25)	(6.68)	(8.03)	(3.38)	(3.64)
1st stage F-Stat.			[6.20]	[5.10]	[7.09]	[6.11]
Δ Micro	1.59	2.62***	4.31	4.41	-1.46	-1.21
	(2.19)	(0.92)	(9.19)	(10.04)	(5.34)	(5.40)
1st stage F-Stat.			[14.17]	[13.00]	[12.88]	[12.14]
Δ Small	3.79***	0.80**	13.68***	14.51***	0.13	0.15
	(0.83)	(0.34)	(3.90)	(4.57)	(1.68)	(1.85)
1st stage F-Stat.			[5.94]	[4.73]	[8.80]	[7.28]
P-value: Equality of the four coefficients	0.284	0.050	0.001	0.001	0.537	0.591
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik shift–share IV			Yes	Yes	Yes	Yes
Observations	3,600	3,546	3,600	3,600	3,600	3,546

Notes. The dependent variable is the 3–year change in non–tradable jobs. The estimation dataset contains one observation per LMA–year. Panel A sums the four size–specific changes in tradable employment, thereby imposing a common multiplier. Panel B includes changes in tradable employment assigned to the large, medium, micro, and small cells simultaneously as four regressors. In columns 3–6, the homogeneous shock is instrumented by the sum of the four size–specific Bartik instruments; in Panel B, each endogenous size–class shock is instrumented by its corresponding Bartik instrument in the same equation. Column 4 adds NUTS-2 × year fixed effects, column 5 adds baseline SLL features interacted with year, and column 6 adds baseline tradable and size–specific employment shares interacted with year. Size–indexed fixed effects from the stacked specification are not applicable once size classes become separate columns. Errors are clustered at the LMA × year level. First–stage Sanderson–Windmeijer F–statistics are in square brackets. *** p<.01, ** p<.05, * p<.1.

Table 5: Effects of a Change in Tradable Jobs on non–tradable Jobs by Agglomeration Type, 3–years change (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
Other LMAs	3.09***	0.46***	6.38***	6.47***	1.60***	1.64***
	(0.87)	(0.10)	(1.41)	(1.43)	(0.54)	(0.55)
1st stage F-Stat.			[43.92]	[53.45]	[25.29]	[24.49]
Industrial Districts	0.63***	0.24***	2.56***	2.70***	0.51**	0.55**
	(0.11)	(0.05)	(0.37)	(0.39)	(0.21)	(0.22)
1st stage F-Stat.			[277.24]	[242.17]	[261.16]	[263.87]
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
R-Squared Within	0.10	0.01				
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non–tradable jobs. Coefficients report agglomeration-specific employment multipliers from interacted specifications in which the tradable employment shock is allowed to vary across industrial districts and other LMAs. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). The 1st stage F–statistics are in square brackets. *** p<.01, ** p<.05, * p<.1.

Table 6: Effects of a Change in Tradable Jobs on non–tradable Jobs by Macro-area, 3–years change (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
North-West	3.74***	0.95***	5.60***	5.77***	1.26***	1.28***
	(1.16)	(0.23)	(1.55)	(1.66)	(0.44)	(0.44)
1st stage F-Stat.			[64.74]	[35.82]	[31.20]	[30.25]
North-East	0.87***	0.32***	3.46***	3.56***	0.92***	0.94***
	(0.13)	(0.06)	(0.46)	(0.55)	(0.26)	(0.27)
1st stage F-Stat.			[419.51]	[259.48]	[255.73]	[254.48]
Center	1.60	-0.17	6.11***	6.51***	-0.45	-0.39
	(1.11)	(0.20)	(2.27)	(2.53)	(0.64)	(0.64)
1st stage F-Stat.			[96.89]	[48.90]	[30.66]	[30.43]
South	1.11*	-0.15	7.05***	7.46***	-4.10***	-4.03***
	(0.58)	(0.38)	(2.22)	(2.53)	(1.55)	(1.57)
1st stage F-Stat.			[78.25]	[45.74]	[31.33]	[30.11]
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
R-Squared Within	0.11	0.03				
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non–tradable jobs. Coefficients report macro-area-specific employment multipliers from interacted specifications in which the tradable employment shock is allowed to vary across North-West, North-East, Center, and South. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). The 1st stage F–statistics are in square brackets. *** p<.01, ** p<.05, * p<.1.

Table 7: Effects of a Change in Tradable Jobs on non–tradable Jobs by City Size, 3–years change (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
Large Cities	3.86***	0.60***	5.81***	5.83***	1.28***	1.30***
	(1.03)	(0.14)	(1.34)	(1.33)	(0.43)	(0.43)
1st stage F-Stat.			[94.42]	[106.81]	[67.19]	[60.43]
Medium Cities	0.79***	0.21***	3.65***	3.76***	0.92***	1.01***
	(0.12)	(0.06)	(0.38)	(0.41)	(0.27)	(0.27)
1st stage F-Stat.			[208.24]	[206.20]	[140.03]	[133.58]
Other LMAs	0.30***	0.19***	1.86***	2.17***	0.89***	1.12***
	(0.05)	(0.04)	(0.24)	(0.38)	(0.25)	(0.26)
1st stage F-Stat.			[346.70]	[325.88]	[242.31]	[228.15]
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
R-Squared Within	0.13	0.01				
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non-tradable jobs. Coefficients report city-size-specific employment multipliers from interacted specifications in which the tradable employment shock is allowed to vary across large cities, medium cities, and other LMAs. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full-control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). The 1st stage F-statistics are in square brackets. *** p<.01, ** p<.05, * p<.1.

Table 8: Size–Cell Multipliers by Agglomeration Type, 3–year Changes (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
			Industrial Districts			
Δ Large	-0.12	-0.20	6.12***	5.20**	0.74	0.98
	(0.23)	(0.13)	(2.13)	(2.04)	(1.07)	(1.23)
Δ Medium	0.70***	0.45***	2.32***	2.61***	1.33*	1.50*
	(0.20)	(0.08)	(0.48)	(0.67)	(0.70)	(0.82)
Δ Micro	0.57***	0.41***	-0.69	-0.52	-0.50	-0.71
	(0.21)	(0.12)	(1.40)	(1.83)	(0.61)	(0.73)
Δ Small	0.98***	0.24***	4.43***	4.85***	1.03*	1.21*
	(0.26)	(0.09)	(0.70)	(0.83)	(0.58)	(0.67)
			Other LMAs			
Δ Large	1.74	0.21	6.56***	6.44***	2.34*	2.54*
	(1.08)	(0.16)	(2.16)	(2.16)	(1.29)	(1.40)
Δ Medium	3.51***	0.62***	9.26**	9.98**	6.13	6.45
	(0.99)	(0.18)	(3.98)	(4.31)	(4.50)	(4.91)
Δ Micro	2.43**	0.61***	2.35	2.28	0.36	0.34
	(1.22)	(0.22)	(2.14)	(2.23)	(0.90)	(0.94)
Δ Small	5.27***	0.70***	9.43***	9.71***	2.64***	2.76**
	(0.85)	(0.20)	(1.23)	(1.38)	(1.00)	(1.09)
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik shift-share IV			Yes	Yes	Yes	Yes
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non–tradable jobs. The independent variables are the 3–year local labor market changes in tradable employment assigned to contemporaneous establishment–size cells and interacted with agglomeration status (IDs vs Other LMAs). Columns 1–2 report OLS estimates, while columns 3–6 report Bartik–IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share). Coefficients are size–cell marginal effects from margins over size–agglomeration cells. *** p<.01, ** p<.05, * p<.1.

Table 9: Placebo Test Using Future National Shifts: Size–Cell Multipliers, 3–year Changes (2012–2020)

	PLACEBO INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)
Δ Large	4.64	4.02	-0.82	-0.84
	(3.43)	(3.02)	(0.72)	(0.76)
1st stage F-Stat.	[15.48]	[26.98]	[5.70]	[4.94]
Δ Medium	9.78**	9.32**	-0.61	-0.63
	(4.17)	(4.18)	(0.85)	(0.91)
1st stage F-Stat.	[17.97]	[16.62]	[7.14]	[6.31]
Δ Micro	2.59	2.50	-0.15	-0.14
	(2.48)	(2.59)	(0.25)	(0.25)
1st stage F-Stat.	[31.45]	[33.11]	[11.76]	[10.27]
Δ Small	8.17***	8.73***	-0.02	-0.02
	(1.33)	(1.33)	(0.43)	(0.46)
1st stage F-Stat.	[108.63]	[93.58]	[42.88]	[34.41]
P-value: Joint equality with Large	0.012	0.005	0.285	0.281
LMAs FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes
NUTS-2 × Year FE		Yes	Yes	Yes
NUTS-2 × Size FE		Yes	Yes	Yes
Size × Year FE		Yes	Yes	Yes
SLL Features × Year			Yes	Yes
Industry Composition × Year				Yes
Observations	7,092	7,092	7,092	7,092

Notes. The dependent variable is the 3–year change in non–tradable jobs. All columns report IV estimates using a placebo Bartik instrument built from the three–year lead of the national industry–size employment shock. The independent variables are the 3–year local labor market changes in tradable employment assigned to contemporaneous establishment–size cells. Errors are clustered at the LMA × Year level. The sample is restricted to observations for which the placebo instrument is observed, so every specification uses the same LMA–year–size cells. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share), exactly as in Table 3. The 1st stage F–statistics are in square brackets. Coefficients are size–cell marginal effects from margins over size classes, with the micro cell as the omitted category in the underlying interacted specification. The row 'P-value: Joint equality with Large' reports the p–value of the null hypothesis that the medium–, micro–, and small–cell coefficients are jointly equal to the large–cell coefficient. A failure to find placebo effects supports the exclusion restriction for the contemporaneous shift, but is not by itself a definitive test if national shocks are serially correlated. *** p<.01, ** p<.05, * p<.1.

TABLE 10: WAGE–RESTRICTED SIZE–CELL COEFFICIENTS, 3–YEAR CHANGES (2012–2020)

	OLS		INSTRUMENTAL VARIABLE			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Large	1.58**	0.21*	6.42***	6.58***	2.25**	2.41**
	(0.72)	(0.12)	(2.34)	(2.44)	(0.94)	(0.99)
Δ Medium	2.12***	0.36***	5.79***	6.01***	1.77***	1.88***
	(0.63)	(0.07)	(1.58)	(1.66)	(0.65)	(0.69)
Δ Micro	3.16***	0.64***	4.60***	4.94***	0.88**	0.90**
	(0.72)	(0.15)	(1.19)	(1.28)	(0.39)	(0.41)
Δ Small	2.71***	0.51***	5.11***	5.40***	1.27***	1.33***
	(0.64)	(0.10)	(1.08)	(1.15)	(0.42)	(0.44)
1st stage F-Stat			[39.77]	[34.12]	[14.83]	[13.70]
LMAs FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Industry Composition × Year		Yes				Yes
Bartik IV			Yes	Yes	Yes	Yes
Observations	14,400	14,184	14,400	14,400	14,400	14,184

The dependent variable is the 3–year change in non–tradable jobs. In every column, the specification imposes that non–tradable size–cell multipliers lie on a common line in the baseline hourly wage paid by each establishment–size class. The class–level wage is the 2014 national employment–weighted mean hourly gross pay for each establishment–size class across tradable 2–digit industries. Rows report the fitted size–cell marginal effects implied by that restricted specification. The restriction organizes the heterogeneity in a manner consistent with the local consumption channel but does not identify that channel causally. Columns 1–2 report OLS estimates, while columns 3–6 report Bartik-IV estimates. Errors are clustered at the LMA × Year level. The number of observations refers to the number of LMAs × the number of years considered × the 4 size classes. Full–control specifications add year interactions with SLL features (population, human capital, district, urban class) and industry composition (tradable share and size share), exactly as in Table 3. The 1st stage F–statistics are the minimum Sanderson–Windmeijer statistics across the two endogenous regressors in each IV specification. *** p<.01, ** p<.05, * p<.1.

Table 11: Reduced–Form Propagation to Top–5 Linked Tradables by Size Cell, 3–year Changes (2012–2020)

	OLS		REDUCED FORM			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Large	0.04	-0.18***	0.82***	0.75***	0.01	0.01
	(0.07)	(0.06)	(0.27)	(0.24)	(0.06)	(0.06)
Δ Medium	0.21**	-0.06*	2.46***	2.28***	0.51***	0.52***
	(0.09)	(0.04)	(0.77)	(0.74)	(0.15)	(0.15)
Δ Micro	0.58***	-0.08	0.09	0.16	-0.24**	-0.24**
	(0.22)	(0.07)	(0.25)	(0.24)	(0.09)	(0.10)
Δ Small	0.58***	0.10***	2.15***	2.08***	0.33***	0.33***
	(0.21)	(0.04)	(0.61)	(0.59)	(0.12)	(0.12)
P-value: Joint equality with Large	0.010	0.000	0.000	0.000	0.000	0.000
LMA × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Focal Industry Share × Year		Yes				Yes
Size Share × Year		Yes				Yes
Shock Proxy (z_i)			Yes	Yes	Yes	Yes
Observations	216,468	210,292	216,468	216,468	216,468	210,292

The dependent variable is the 3–year change in employment in the focal industry's top-5 upstream plus top–5 downstream tradable partners. Columns 1–2 report OLS specifications using the 3–year change in focal tradable employment by size. Columns 3–6 report reduced-form specifications using z_i, the leave–one–out Bartik proxy for the focal tradable shock, interacted with size. The specifications progressively add industry × year FE, NUTS-2 × year FE, SLL features × year, focal-industry share × year, and size-share controls. Rows report size–cell marginal effects from margins over size classes. Errors are clustered at the LMA × Year level. The row 'P-value: Joint equality with Large' reports the p–value of the null hypothesis that the Medium–, Micro–, and Small–cell coefficients are jointly equal to the Large–cell coefficient. *** p<.01, ** p<.05, * p<.1.

Table 12: Reduced–Form Propagation to Other Tradables by Size Cell, 3–year Changes (2012–2020)

	OLS		REDUCED FORM			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Large	0.38*	-0.17***	2.30***	2.07***	0.25**	0.27**
	(0.19)	(0.05)	(0.69)	(0.63)	(0.12)	(0.13)
Δ Medium	0.60***	-0.02	5.46***	5.09***	0.82***	0.86***
	(0.19)	(0.05)	(1.82)	(1.75)	(0.28)	(0.29)
Δ Micro	1.56***	-0.09	0.46	0.59	-0.41***	-0.40***
	(0.51)	(0.09)	(0.56)	(0.55)	(0.08)	(0.09)
Δ Small	1.35***	0.20***	4.86***	4.72***	0.48**	0.53**
	(0.52)	(0.06)	(1.43)	(1.38)	(0.21)	(0.21)
P-value: Joint equality with Large	0.003	0.000	0.004	0.003	0.000	0.000
LMA × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Year FE		Yes		Yes	Yes	Yes
NUTS-2 × Size FE		Yes		Yes	Yes	Yes
Size × Year FE		Yes		Yes	Yes	Yes
SLL Features × Year		Yes			Yes	Yes
Focal Industry Share × Year		Yes				Yes
Size Share × Year		Yes				Yes
Shock Proxy (z_i)			Yes	Yes	Yes	Yes
Observations	216,468	210,292	216,468	216,468	216,468	210,292

The dependent variable is the 3–year change in employment in all other tradable industries within the same LMA, excluding the focal industry itself. Columns 1–2 report OLS specifications using the 3–year change in focal tradable employment by size. Columns 3–6 report reduced–form specifications using z_i, the leave–one–out Bartik proxy for the focal tradable shock, interacted with size. The specifications progressively add industry × year FE, NUTS-2 × year FE, SLL features × year, focal–industry share × year, and size–share controls. Rows report size–cell marginal effects from margins over size classes. Errors are clustered at the LMA × Year level. The row 'P-value: Joint equality with Large' reports the p–value of the null hypothesis that the Medium–, Micro–, and Small–cell coefficients are jointly equal to the Large–cell coefficient. *** p<.01, ** p<.05, * p<.1.