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How Amazon shapes local labour markets: Impacts on income and employment across Italian municipalities

Jacopo Tramontano* Valeria Cirillo† Dario Guarascio‡

Abstract

Over the past decade, e-commerce platforms have emerged as key drivers of economic transformation, reshaping local labour markets. This study examines the impact of Amazon's expansion in Italy through the establishment of Fulfillment Centers (FCs) and Delivery Stations (DSs) on municipal-level wages, employment and income distribution. Using administrative tax data for 2013–2023 and a staggered difference-in-differences design, we find that Amazon's entry reduces per capita wages, particularly following the opening of DSs in urban municipalities. FCs also increase the number of low-income earners while reducing high-income earners, contributing to income polarisation.

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Keywords: Amazon, e-commerce, digital platforms, staggered difference-in-difference, wages, employment, Italy

JEL classification: J30, L81, J23, O33

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1 Introduction

E-commerce platforms have become central actors in contemporary capitalism, reshaping not only retail markets but also the spatial organisation of production, distribution, and consumption. By combining digital marketplaces with extensive logistics infrastructures, platforms such as Amazon increasingly influence where economic activity takes place, how firms organize supply chains, and how workers are matched to employment. While the digital nature of these platforms might suggest a reduced importance of geography, their expansion has instead generated an unprecedented demand for strategically located warehouses, fulfilment centres, and last-mile delivery networks, reinforcing the importance of place in the digital economy.

The rapid expansion of Amazon exemplifies this transformation (Rodrigue, 2020). Through a growing network of Fulfilment Centres (FCs) and Delivery Stations (DSs), Amazon has become one of the largest employers in logistics and a major source of local investment across advanced economies. Existing research has documented substantial effects on retail competition, firm dynamics, housing markets, and employment (e.g., Bauer and Fernández Guerrico, 2023, Chava et al., 2024, Fried and Goodchild, 2023). However, much less is known about how the spatial expansion of e-commerce platforms affects the quality of employment and the distribution of income across local labour markets. In particular, whether Amazon generates broad-based local prosperity or instead reinforces territorial and distributional inequalities remains an open question.

From an economic geography perspective, there are reasons to expect heterogeneous local effects. Fulfilment Centres are typically located in peripheral areas

where land is relatively inexpensive and labour markets differ markedly from those of large metropolitan regions, whereas Delivery Stations are concentrated near densely populated urban areas to support rapid last-mile delivery. These different locational strategies imply distinct labour demand, occupational structures, and wage-setting mechanisms, suggesting that the consequences of platform expansion may vary systematically across space. Understanding these spatially differentiated effects is essential for assessing how digital platforms reshape regional development and labour market inequality.

This article investigates the local labour market consequences of Amazon's expansion in Italy. Exploiting the staggered opening of Amazon facilities between 2013 and 2023, we combine detailed information on the location and timing of FCs and DSs with municipality-level administrative data on wages, employment, and taxable income from the Italian Ministry of Economy and Finance. We estimate causal effects using a staggered difference-in-differences design that compares municipalities belonging to the same local labour market areas (hereafter LMAs) before and after Amazon's entry.

Our findings show that Amazon's expansion does not translate into broad wage gains. Instead, the opening of new facilities reduces average per-capita wages without generating significant employment growth. These effects are geographically heterogeneous. Wage declines are primarily driven by Delivery Stations located in urban labour markets, while Fulfilment Centres mainly affect the composition of local incomes by increasing the number of low-income earners and reducing the number of high-income earners. Overall, Amazon's expansion is associated with greater income polarization and uneven labour market outcomes across territories.

The article contributes to the literature in three respects. First, it provides new ev-

idence on how digital platforms shape local labour markets through the expansion of their physical logistics networks. Second, it highlights the importance of geography by showing that the labour market consequences of platform expansion depend on the type and location of logistics infrastructure. Third, it contributes to debates on regional inequality by demonstrating that the benefits of e-commerce expansion are unevenly distributed across places and income groups. More broadly, the findings suggest that the digital economy remains deeply embedded in local labour markets and that the geography of logistics has become an increasingly important channel through which digital platforms influence regional development.

The remainder of this article proceeds as follows. Section 2 reviews the relevant literature and outlines the research questions. Section 3 presents the data and the empirical strategy. Section 4 reports the results, and Section 5 concludes.

2 Background literature and research questions

The rapid expansion of digital platforms has generated growing interest in their implications for market organisation, regional development, and labour markets. Rather than simply reducing the importance of geography, digital platforms combine digital intermediation with extensive physical infrastructures, reshaping where economic activity takes place and how firms, workers, and consumers interact. Consequently, recent research has increasingly recognised that platform economies remain deeply embedded in place, with their expansion producing geographically uneven economic outcomes (Kenney and Zysman, 2020). The economics of digital platforms emphasises their role as intermediaries coordinating interactions among heterogeneous users through algorithmic governance and data-driven matching

mechanisms (Belleflamme and Peitz, 2021, Kenney and Zysman, 2016, Srnicek, 2017, Urzì Brancati et al., 2019). Strong network effects enable successful platforms to achieve dominant market positions, reinforcing economies of scale while extracting rents from their intermediary role (Cutolo and Kenney, 2021). In e-commerce, these mechanisms substantially reduce search and transaction costs, may increase price transparency, and intensify competition across geographically dispersed markets (Acs et al., 2021, Goldfarb and Tucker, 2019). At the same time, digital platforms reshape market structures through self-preferencing, vertical integration, and control over data, contributing to increasing market concentration and raising concerns regarding competition and market power (Farronato and Fradkin, 2022, Khan, 2016, Waldfogel, 2024).

The implications of platform expansion for labour markets remain considerably more ambiguous. On the one hand, e-commerce platforms generate new demand for logistics, transportation, warehousing, and digital services. On the other hand, they intensify competitive pressures on traditional retailers and accelerate the reorganisation of production and distribution networks. As a result, employment creation and destruction occur simultaneously across sectors and places, producing heterogeneous local labour market effects that depend on industrial structure, occupational composition, and regional economic conditions (Brynjolfsson et al., 2009, Forman et al., 2009, 2012). Existing evidence suggests that wages tend to increase in sectors complementing platform activities while declining in sectors directly exposed to platform competition (Bauer and Fernández Guerrico, 2023, Chava et al., 2024). Moreover, labour market adjustments differ substantially across skill groups, reflecting differences in occupational exposure to technological change and digitalisation (Cirillo et al., 2021, 2025a).

Among digital platforms, Amazon represents perhaps the most influential example of the integration between digital intermediation and physical logistics infrastructure. Beyond its dominant online marketplace, Amazon has developed an extensive transnational logistics network that has transformed the organisation of retail distribution and increasingly shapes local economic development (Cirillo et al., 2025b, Coveri et al., 2022, Massimo, 2020). By combining data-driven management with sophisticated logistics capabilities, the company coordinates production, transportation, and last-mile delivery while exercising substantial control over workers, subcontractors, and third-party sellers (Coveri et al., 2022, Delfanti, 2021).

A growing body of literature has therefore examined Amazon's consequences for labour processes and working conditions. Research documents how algorithmic management and intensive performance monitoring contribute to increasing work intensity, workplace injuries, and economic insecurity among warehouse workers (Benvegnù et al., 2018, Cirillo et al., 2025b, Delfanti, 2021, Gutelius and Theodore, 2019). Other studies have investigated Amazon's broader competitive effects, highlighting its influence on vendors operating within its marketplace, traditional brick-and-mortar retailers, and local business ecosystems (Chava et al., 2024, Khan, 2016, Zhu and Liu, 2018). Taken together, these contributions show that Amazon's influence extends well beyond its direct workforce, affecting entire local production systems through the reorganisation of retail and logistics activities.

Despite this rapidly expanding literature, important questions remain unanswered. First, most empirical evidence focuses on the United States, while considerably less is known about European labour markets, whose institutional settings differ substantially with respect to wage bargaining, employment protection, and industrial

relations. Second, existing studies primarily examine employment creation or retail displacement, paying much less attention to wage dynamics and the distributional consequences of platform expansion. Third, relatively little is known about how the different components of Amazon's logistics network generate heterogeneous effects across local labour markets. Since fulfilment centres and last-mile delivery stations perform distinct functions and locate in different territorial contexts, they are likely to interact differently with local labour demand, wage formation, and income distribution.

Against this background, this article examines how Amazon's expansion affects local labour market outcomes in Italy. Italy offers a particularly interesting setting because the rapid growth of e-commerce has coincided with profound changes in retail, logistics, and production networks, while Amazon has progressively expanded its physical presence through an increasingly dense logistics infrastructure (Guarascio and Sacchi, 2018).

Amazon's logistics network in Italy is organised around two complementary types of facilities. Fulfilment Centres (FCs) are large labour-intensive warehouses that receive and process goods before distribution. Owing to their substantial land requirements and reliance on highway accessibility, they are typically located in peripheral areas characterised by lower land costs and relatively abundant labour supply (Cattero and D'Onofrio, 2018, Fried and Goodchild, 2023, Kang, 2020, Risberg, 2023, Rodrigue, 2020). Delivery Stations (DSs), by contrast, constitute the final stage of Amazon's logistics chain and are located close to large urban centres to facilitate same-day and next-day delivery. This distinct locational logic suggests that FCs and DSs may generate different labour market effects, reflecting differences in local labour market conditions, occupational structures, and competitive

pressures. [1] Building on these considerations, we address two related questions. First, how does the establishment of an Amazon facility affect wages and employment in local labour markets? Second, do these effects differ across the income distribution and between Fulfilment Centres and Delivery Stations?

The net effect of Amazon's expansion is theoretically ambiguous. New logistics facilities directly increase labour demand and may stimulate local economic activity through multiplier effects. At the same time, increased competition with traditional retailers may reduce employment and wage growth in incumbent firms. Moreover, because FCs and DSs locate in markedly different territorial contexts and perform distinct functions within Amazon's logistics network, their effects are unlikely to be spatially uniform. Understanding how these opposing mechanisms interact is therefore ultimately an empirical question. To address these issues, we exploit the staggered opening of Amazon facilities across Italian local labour market areas between 2013 and 2023. To the best of our knowledge, this is the first study to provide causal evidence for a European country on how the expansion of Amazon's logistics infrastructure affects wages, employment, and income distribution at a highly disaggregated geographical scale.

[1] Figure A.1 in the Appendix shows that FCs and Sortation Centers (hereafter, SC) - a third type of Amazon facilities forming part of Amazon's Italian logistics network - are concentrated in Northern Italy and tend to be located in LMAs farther from major urban centres. In contrast, DSs form the backbone of Amazon's rapid-delivery network and are situated near almost all cities with more than 100,000 inhabitants. Figures A.2 and A.3 in the Appendix illustrate the relationship between Amazon warehouse type and population density and travel time to the nearest highway access point (Figure A.2), as well as the degree of urbanisation (Figure A.3).

3 Data, descriptive evidence and empirical strategy

3.1 Data and descriptive statistics

To examine the impact of e-commerce on labour market outcomes, we construct a novel municipality-level dataset that combines detailed information on the opening of Amazon facilities in LMAs with key labour market indicators over the period 2011-2023. We apply a difference-in-difference empirical estimation following Callaway and Sant'Anna (2021), as detailed in section 3.2. In the remainder of this section, we describe the construction of the main variables used in the analysis and present descriptive evidence on labour market outcomes across municipalities exposed to the opening of Amazon facilities.

Treatment variable. We assemble information on the opening of Amazon facilities by compiling a comprehensive list of Amazon logistics centres from a logistics consulting firm (mwpvl.com). This publicly available dataset has previously been used in studies focused on the United States (Bauer and Fernández Guerrico, 2023, Chava et al., 2024). We validate each entry by cross-referencing local newspaper reports, which typically report new warehouse openings. Between 2011 and 2023, Amazon opened 57 facilities across Italian municipalities. We exclude from the analysis: (i) the first Amazon opening in Italy, as it falls outside the scope of our data; (ii) the facilities located in LMAs already characterized by Amazon's presence; and (iii) the facilities inaugurated in 2023, due to the absence of a post-treatment period in the available data. The final sample comprises 37 events of

facility openings across distinct LMAs over the 2015–2022 period.[2] Although the unit of observation is the municipality, treatment is defined at the level of Labour Market Areas (LMAs)[3]. This captures the fact that proximity to a facility affects both local employment and delivery efficiency through reduced shipping times, with implications for surrounding labour markets (Chava et al., 2024). All municipalities within a treated LMA are therefore considered treated.

Dependent variables. In the analysis, we focus on four municipality-level labour market outcomes: (i) average wage; (ii) number of wage earners; (iii) average income by income group; and (iv) number of earners by income group. We link facility openings to income tax data from the Italian Ministry of Economy and Finance (MEF), which reports annual total labour income (gross wages) and the number of wage earners in each municipality over 2013–2023. Wages are defined as income from subordinate employment, and employment is measured by the number of employees. Income-group outcomes are constructed using disposable income, which underlies taxable income in Italy's progressive tax system. Income brackets are defined as follows: below 0, 0–10,000 €, 10–15,000 €, 15–26,000 €, 26–55,000 €, 55–75,000 €, 75–120,000 €, and above 120,000 €. To mitigate potential misreporting at the extremes, we exclude the lowest and highest brackets and aggregate the remaining categories into three groups: 0–26,000 €, 26–55,000 €, and 55–120,000 €, used throughout the analysis.

[2]To account for potential anticipation effects, we assign facilities opened in the third quarter of a given year to the following calendar year.

[3]Eurostat – European Harmonised Labour Market Areas: Methodology on Functional Geographies with Potential, 2020 edition, `https://tinyurl.com/euharmlma2020`. An LMA is defined as a functional area in which at least 80% of the employed population commutes within its boundaries.

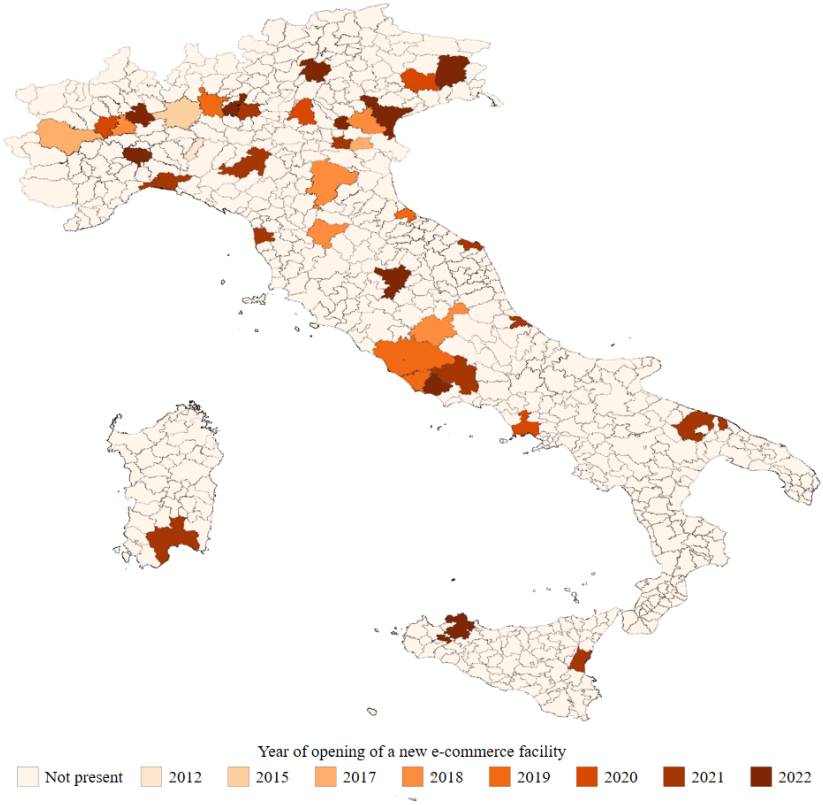
Table 1: Mean and standard deviation (in brackets) of labour market outcomes for municipalities, 2013

	Not present	FC	DS	Total
Number of employees in municipality	1813 (4162)	3962 (21452)	7430 (39125)	2541 (14389)
Per capita wages	18145 (3603)	21639 (3822)	20387 (3091)	18616 (3724)
Number of income earners under 26,000 €	2890 (6117)	5113 (25840)	10373 (50759)	3817 (18659)
Per capita income for the 0-26,000 € income bracket	12061 (1746)	13647 (1162)	12975 (1263)	12265 (1732)
Number of income earners between 26,000 € and 55,000 €	631 (1744)	1771 (10657)	3163 (19402)	971 (7059)
Per capita income for the 26-55,000 € income bracket	33369 (1807)	33960 (958)	33831 (864)	33457 (1697)
Number of income earners over 55,000 €	112 (388)	471 (4689)	754 (6111)	203 (2352)
Per capita income for the 55-120,000 € income bracket	70893 (36658)	82578 (25188)	82231 (21528)	72867 (34967)
Number of municipalities	6661 (82.8%)	552 (6.9%)	832 (10.3%)	8045 (100.0%)

Descriptive statistics. As shown in Table 1, municipalities hosting an Amazon facility differ systematically from those without. They have, on average, more employees and higher per-capita wages and are more densely populated. Accordingly, they also exhibit a larger number of taxpayers across all income brackets. Average income within brackets is higher in Amazon municipalities at the bottom and top of the distribution, while differences are negligible among middle-income earners.[4] Going further in the descriptive analysis, Figure 1 illustrates the temporal and spatial evolution of Amazon's expansion across Italy. Expansion initially concentrated in Northern Italy and around Rome before extending, primarily via DSs, to major cities in Central and Southern Italy. These spatial and temporal heterogeneities are accounted for in the empirical strategy, as described in the next section.

[4]Table A.1 in the Appendix reports descriptive statistics excluding Milan. Excluding Milan reveals additional heterogeneity: FC municipalities are broadly similar to non-treated municipalities, except for persistently higher per-capita wages. These patterns are consistent with Amazon's strategy of locating FCs in peripheral municipalities, primarily within wealthier areas of Northern Italy.

Figure 1: Spatial and Temporal Evolution of Amazon's Expansion in Italy



3.2 Empirical strategy

To assess the impact of the opening of a new e-commerce facility on local labour market outcomes, we adopt an event-study framework using the staggered difference-in-differences estimator developed by Callaway and Sant'Anna (2021). This approach aggregates the results of a series of difference-in-differences estimations, each measuring the effect of a facility opening (the event) on a given territory in a specific year. The aggregation procedure accounts for heterogeneity across treatment cohorts and municipalities, allowing us to recover both the dynamic effects of a new Amazon facility over time and the average treatment effect at each event

time.

Municipalities that never receive a facility may differ systematically from treated municipalities in ways that are correlated with Amazon's location decisions. To address this concern, we use not-yet-treated municipalities as the control group. These municipalities are scheduled to receive a facility in future periods but remain untreated during the period corresponding to the treatment cohort under consideration. Using not-yet-treated municipalities as controls helps mitigate concerns related to spatial correlation and potential selection bias, given that Amazon's location choices are unlikely to be random.

More formally, let (k=1,...,K) index the set of labour market outcomes considered in the analysis, including average wage, number of wage earners, average income by income group, and number of earners by income group. For each outcome (k), the parameter of interest is the cohort-time average treatment effect (ATT) equal to the following formula:

$$E\left[Y^k t(g) - Y^k t(0) \mid G = g\right], \tag{1}$$

where ($ATT^k g, t$) denotes the average treatment effect on outcome (k) for municipalities first exposed to the treatment in period (g), evaluated at time (t). Here, ($Y^k t(g)$) represents the potential outcome under treatment, ($Y_t^k(0)$) denotes the corresponding untreated potential outcome, and (G) identifies the treatment cohort. Therefore, for each labour market outcome (k), we estimate the following specification:

$$Y^k c,t = \alpha^k + \beta^k PostAmazonc,t \geq g + \Phi^k c + \Theta^k t + \epsilon^k_{c,t}, \tag{2}$$

where $(Y^k c,t)$ denotes labour market outcome (k) in municipality (c) and year (t), and $(PostAmazonc,t \geq g)$ is an indicator variable equal to one for municipalities exposed to an Amazon facility from treatment year (g) onwards, and zero otherwise. The terms $(\Phi^k c)$ and $(\Theta^k t)$ denote municipality and year fixed effects, respectively. Standard errors are computed using the inverse-probability-weighted estimator and statistical inference is conducted using a wild bootstrap procedure, following Rios-Avila et al. (2021). The coefficient (β^k) captures the average effect of the opening of an Amazon facility on labour market outcome (k).

More in detail, to address our first research question - *how does the establishment of an Amazon facility affect wages and employment in local labour markets?* - we consider two labour market outcomes: (i) the logarithm of average wages and (ii) the logarithm of the number of income earners. The model is first estimated using the full sample of Amazon facilities and subsequently estimated separately for municipalities affected by Fulfilment Centres (FCs) and Delivery Stations (DSs), allowing for heterogeneity in treatment effects across facility types.

Moreover, to address our second research question - *does the establishment of an Amazon facility differ across the income distribution and between Fulfilment Centres and Delivery Stations?* - we examine the distributional effects of Amazon facility openings using two sets of outcomes: (i) average income in logarithmic form by income bracket and (ii) the logarithm of the number of income earners within each income bracket. Income brackets are defined as follows: up to 26,000

€, between 26,000 and 55,000 €, and between 55,000 and 120,000 €. As in the previous analysis, we first estimate the model using the full sample of Amazon facilities and subsequently distinguishing between municipalities affected by FCs and those affected by DSs.

Lastly, in section 4.1 we validate the estimations by performing two main robustness checks: first, we redefine the treatment area using a distance-based criterion rather than LMA; second, we re-estimate equation 2 after excluding Milan, whose size and economic importance may disproportionately influence the results.

4 Results

The results, interpreted within the Callaway and Sant'Anna (2021) staggered event-study framework, suggest that the average treatment effects on wages are negative (Table 2), although the magnitude and statistical significance of the estimates vary across event time and specifications (Figure 2). This aggregate effect appears to be driven primarily by municipalities exposed to Delivery Stations (DSs), while the corresponding effects for Fulfilment Centres (FCs) are close to zero and not statistically distinguishable from zero. This heterogeneity across treatment cohorts is consistent with differential responses depending on facility type, although the analysis does not directly identify the underlying mechanisms. In contrast, we find no robust evidence of positive effects on the number of income earners (Table 3). The estimated cohort-specific and event-time effects are generally small and statistically insignificant across specifications, suggesting that the introduction of new e-commerce facilities is not systematically associated with changes in employment levels at the municipal level (Figure 3). Overall, the event-

study results indicate limited and heterogeneous labour market adjustments, with more consistent evidence of wage effects in DS-affected municipalities, while employment effects remain imprecisely estimated across cohorts and event time.

Table 2: Impact of a new Amazon facility on log wages

	(1) All warehouses	(2) Fulfillment Center	(3) Delivery Station
ATT	-0.0048***	-0.0037	-0.0091***
	(0.0014)	(0.0029)	(0.0016)
N	14,889	6,072	8,817

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Impact of a new Amazon facility on the log number of employees

	(1) All warehouses	(2) Fulfillment Center	(3) Delivery Station
ATT	-0.0001	-0.0020	-0.0001
	(0.0017)	(0.0030)	(0.0023)
N	14,889	6,072	8,817

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

More specifically, the baseline estimates indicate a decline of approximately 0.5% in average wages in treated municipalities relative to not-yet-treated municipalities in the static aggregation across cohorts, years, and municipalities. When examining the dynamics of the effect, the estimated impact appears to increase over time. By the fourth year after the establishment of the facility, average wages in treated municipalities are estimated to be more than 1.5% lower. When distinguishing by facility type, the decline is substantially larger in municipalities hosting a Delivery Station (DS), where the effect is roughly twice as large (see Figure 2). Taken together, these results indicate that, with respect to our first research question, the opening of a new Amazon facility is associated with a reduction in local

wages, particularly in municipalities affected by DSs. By contrast, we find no robust evidence that Amazon facility openings lead to changes in employment levels, as the estimated effects on the number of income earners are generally small and statistically insignificant (Figure 3). Overall, the evidence suggests that the main labour market adjustment associated with Amazon's entry operates through wages rather than employment.

Figure 2: Impact of a new Amazon facility on wages

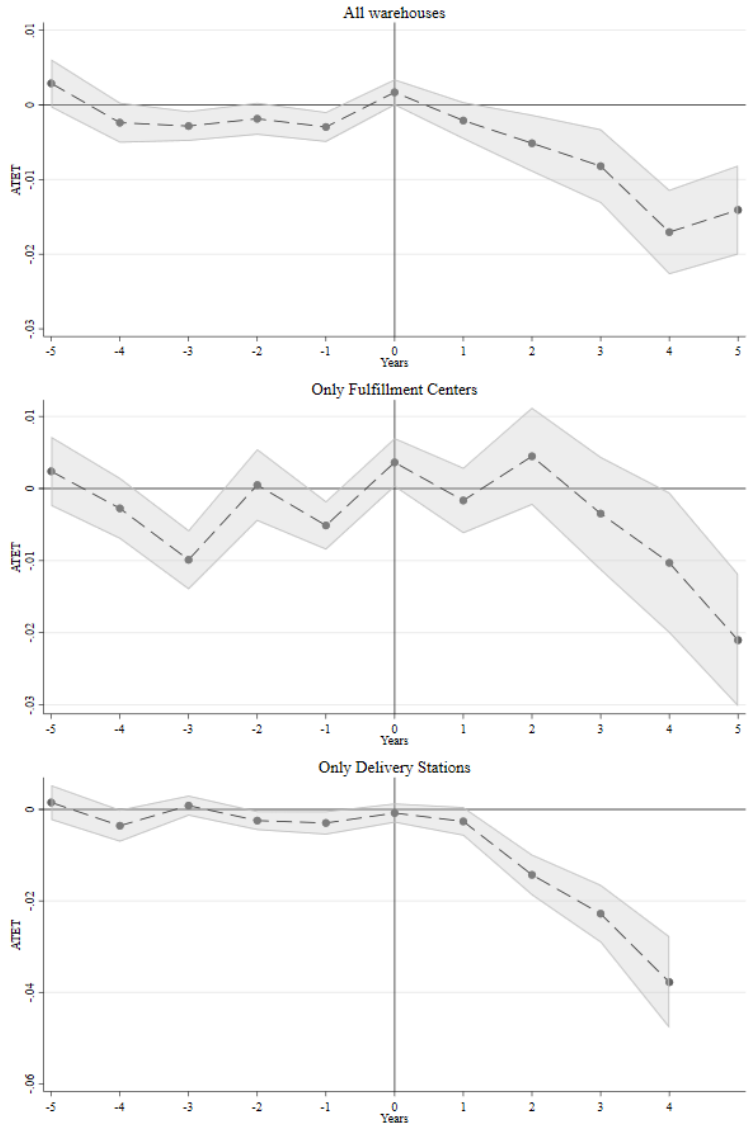
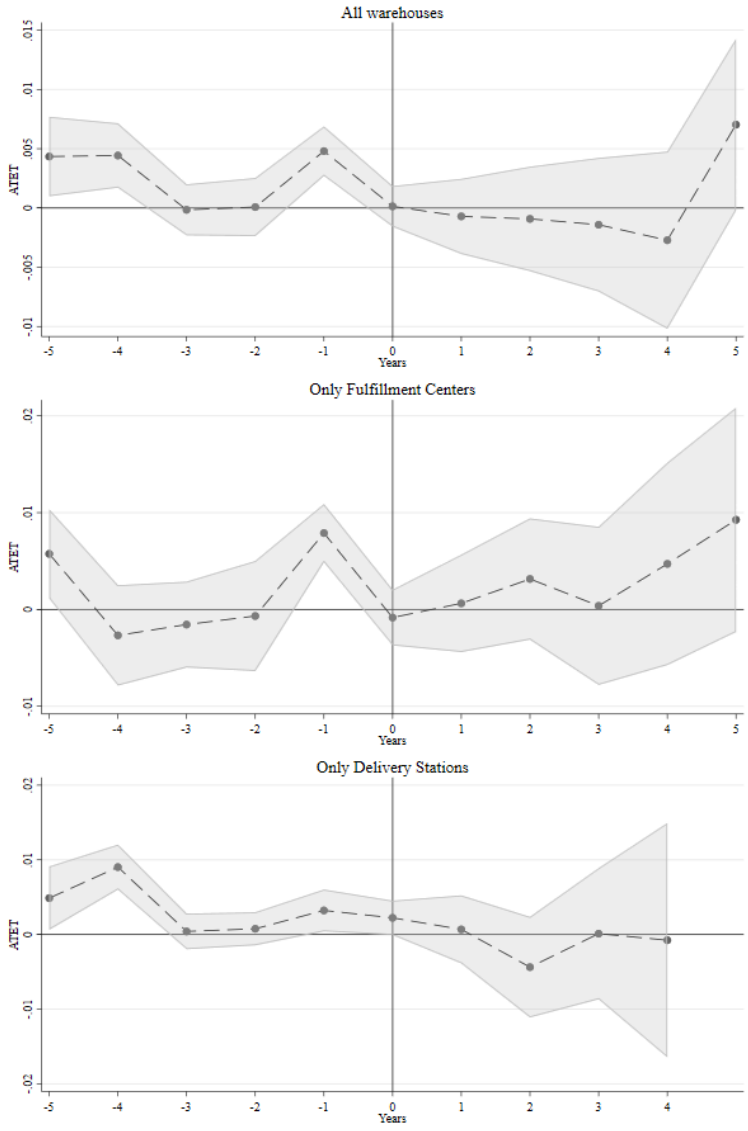


Figure 3: Impact of a new Amazon facility on number of employees



Focusing on our second research question, Table 4 shows that the number of income earners in the lowest income bracket (0–26,000 €) increases in municipalities where a Fulfilment Centre (FC) is present. In contrast, a declining pattern is observed in higher income brackets, with the most pronounced reduction occurring

in the highest bracket (above 55,000 €). This suggests that FC openings may be associated with a relative reallocation of income earners toward lower segments of the income distribution.

Turning to average income by bracket (Table 5), the results indicate a reduction in average income within the lowest bracket, with stronger effects in municipalities hosting FCs. This may reflect downward pressure on income at the lower end of the distribution. By contrast, declines in average income in higher income brackets are primarily driven by municipalities affected by Delivery Stations (DSs), suggesting that different facility types may generate distinct distributional adjustments across the local income structure. Overall, these findings point to heterogeneous distributional effects along the income distribution and across facility types. While FCs appear to be associated with an increase in the number of lower-income earners, DSs are more strongly linked to reductions in average income at higher brackets, highlighting differentiated impacts depending on the nature of the logistics infrastructure.

Table 4: Impact of a new Amazon facility on number of earners by income bracket

	Log of the number of income earners under 26,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	0.0063***	0.0123***	0.0043*
	(0.0014)	(0.0026)	(0.0016)
N	14,889	6,072	8,817
	Log of the number of income earners between 26,000 and 55,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0183***	-0.0265***	-0.0173***
	(0.0024)	(0.0048)	(0.0027)
N	14,888	6,071	8,817
	Log of the number of income earners over 55,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0256***	-0.0354***	-0.0228***
	(0.0051)	(0.0096)	(0.0065)
N	14,131	5,689	8,442

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Variations in N are due to missing data on some income brackets in certain municipalities.

Table 5: Impact of a new Amazon facility on average income by income brackets

	Log income under 26,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0062***	-0.0085***	-0.0044***
	(0.0009)	(0.0016)	(0.0011)
N	14,889	6,072	8,817
	Log income between 26,000€ and 55,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0008*	-0.0016	-0.0014**
	(0.0004)	(0.0008)	(0.0005)
N	14,888	6,071	8,817
	Log income over 55,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0056	-0.0009	-0.0088*
	(0.0039)	(0.0094)	(0.0043)
N	14,131	5,689	8,442

Robust standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Variations in N are due to missing data on some income brackets in certain municipalities.

In light of these results, it appears that Amazon has contributed to a compression of the local income distribution, primarily through a relatively larger reduction in the number of income earners in higher income brackets (Figures 4 and 5), alongside an increase in the number of low-income earners. This pattern is particularly pronounced in municipalities hosting FCs, which also exhibit the largest declines in average income within the lowest bracket. Overall, the evidence suggests that while Amazon facilities may expand employment opportunities at the lower end of the income distribution, they do not appear to foster wage growth. One possible interpretation is that these patterns are consistent with increased monopsony power or labour market concentration effects arising from the grow-

ing importance of the platform as a local employer. However, this interpretation remains suggestive and should be viewed with caution, as the analysis does not directly identify the underlying mechanism.

Figure 4: Impact of new e-commerce facilities on number of earners by income brackets

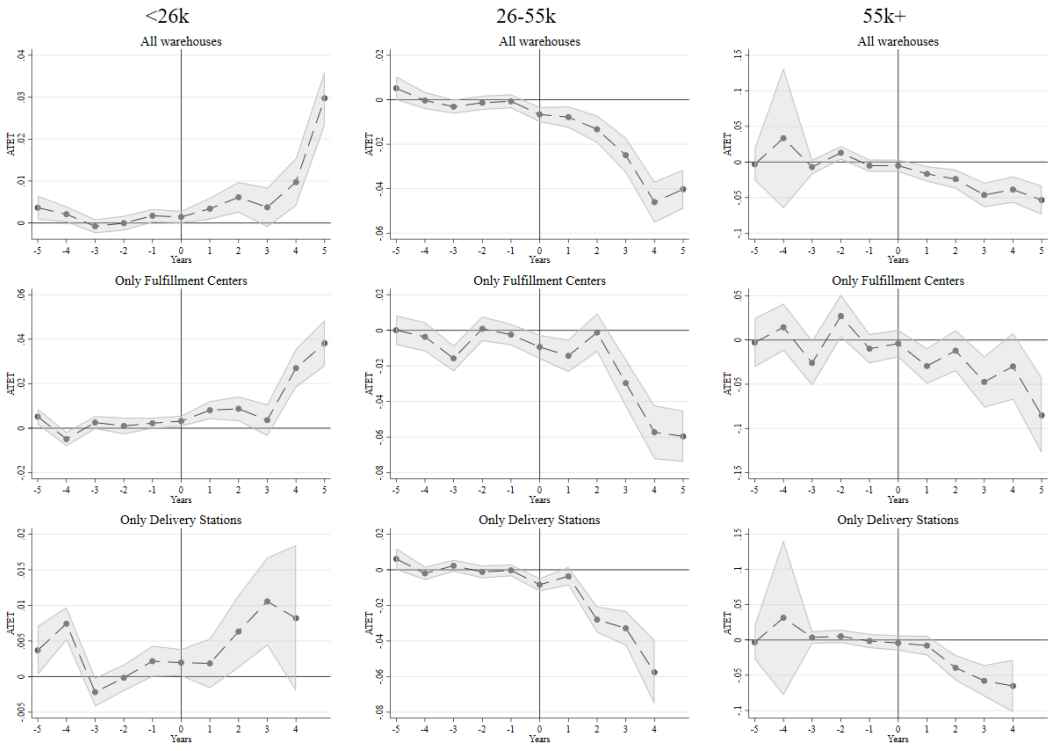
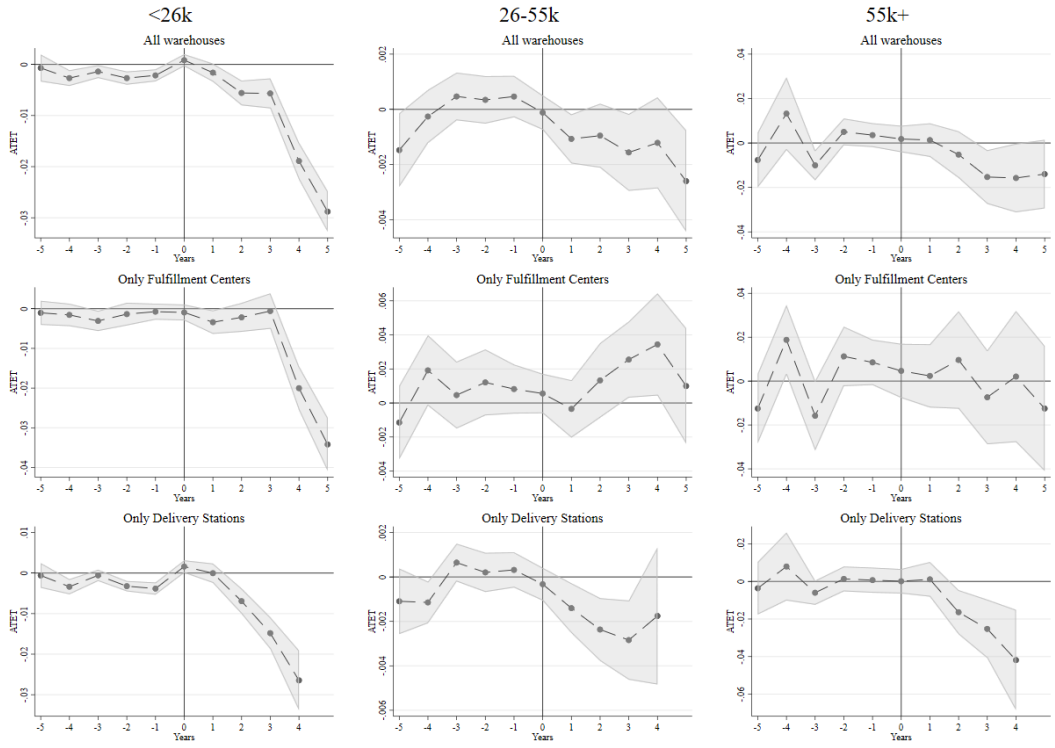


Figure 5: Impact of new e-commerce facilities on average income by income brackets



4.1 Robustness checks

In this section, we conduct two robustness checks to assess the stability of our findings. First, we redefine the treatment area using a distance-based criterion rather than Local Labour Market Areas (LMAs). Second, we re-estimate the models after excluding Milan, whose size and economic importance may disproportionately influence the results.

Regarding the first robustness check, although recent research suggests that consumption zones are generally smaller than commuting zones (Batch et al., 2025), thereby alleviating some concerns about treatment misclassification, LMAs

may still provide an imperfect approximation of the geographic scope of e-commerce expansion. To the extent that the effects of a new Amazon facility spill over beyond LMA boundaries, treatment assignment based on LMAs may introduce measurement error. If present, such misclassification would likely bias the estimated effects. To address this concern, we redefine treatment based on geographic proximity. Specifically, for both urban facilities (Delivery Stations) and peripheral facilities (Fulfilment Centres), municipalities are classified as treated if their centroid lies within a 50-kilometre radius of the centroid of the municipality in which the facility is located.[5] This alternative treatment definition, combined with the use of not-yet-treated municipalities as controls, results in a smaller estimation sample than the baseline LMA-based approach. Nevertheless, the results remain qualitatively unchanged. Both the magnitude and direction of the estimated effects are broadly consistent with the baseline findings, and the dynamic treatment effects reported in Figures A.4 and A.5 closely mirror those obtained in the main analysis. These results provide additional support for the robustness of our conclusions to alternative definitions of the treated area.

Finally, we assess the sensitivity of our results to the inclusion of Milan, which represents Italy's largest and most urbanised LMA and is classified as hosting a FC. To this end, we re-estimate the analysis after excluding the Milan facility from the sample. The exclusion of Milan does not qualitatively alter the results. Since the Milan FC is also the earliest treatment event in our sample, its removal reduces the number of pre-treatment periods available for aggregation from five to four years. Nevertheless, the main findings remain unchanged. Consistent with the baseline

[5]Distances are calculated using municipal geographic centroids. Treatment is assigned whenever the centroid of a municipality falls within a 50-kilometre radius of the centroid of the municipality hosting the facility (Picard, 2019).

estimates, we find no statistically significant effects associated with FCs, while the estimates for DSs become more precise, as reflected in the narrower confidence intervals reported in Figures A.6 and A.7 in the Appendix. Overall, these robustness checks indicate that the estimated effects are not driven by a single facility, a particular geographical configuration, or a specific treatment definition. The results remain broadly stable across alternative identification strategies, providing additional confidence in the validity and robustness of the main findings.

5 Discussion and conclusion

This article provides the first evidence on the local labour market effects of e-commerce expansion in Italy by exploiting the staggered rollout of Amazon's logistics infrastructure. Using municipality-level data and a staggered event-study framework, we estimate the effects of Amazon facility openings on wages, employment, and income distribution. Consistent with recent evidence on e-commerce and digital platforms (Bauer and Fernández Guerrico, 2023, Chava et al., 2024, Chun et al., 2023), our findings indicate that the expansion of e-commerce has generated adverse labour market outcomes. In particular, municipalities exposed to Amazon facilities experience lower wages, although these effects vary substantially across facility types. Delivery Stations (DSs), which are typically located close to urban centres and final consumers, drive the negative wage effects. A plausible interpretation is that e-commerce expansion reshapes local labour demand through changes in the composition of employment. In municipalities served by DSs, where traditional retail activity is more concentrated, increased online competition may displace relatively well-paid retail jobs while generating new employment opportu-

nities in logistics, warehousing, and transportation. Although our data do not allow us to identify sector-specific adjustments, the stronger effects observed around DSs are consistent with this substitution mechanism (Chava et al., 2024, Chen and Tsai, 2023). By contrast, municipalities exposed to FCs do not experience statistically significant changes in aggregate wages or employment. This finding is noteworthy because FCs account for the largest share of Amazon's logistics workforce. If warehouse openings primarily generated new local employment, one would expect positive employment effects in nearby municipalities. Their absence suggests either that employment gains within Amazon are offset by losses elsewhere in the local economy or that the benefits are distributed across a broader geographic area than that captured by local labour markets. Although the available data cannot distinguish between these explanations, the evidence suggests that the labour market consequences of Amazon's logistics expansion are more complex than a simple job-creation narrative would imply.

Additional evidence emerges from the distributional analysis. Following the opening of an Amazon facility, the number of low-income earners increases while average income within this group declines. These patterns suggest that employment opportunities may expand at the lower end of the income distribution without corresponding improvements in earnings. The effects are particularly pronounced in municipalities hosting FCs, where the number of low-income taxpayers rises despite a decline in their average income. At the upper end of the distribution, both the number of high-income taxpayers and their average income decline, especially in municipalities served by DSs. Taken together, these results point to a compression of the local income distribution, driven by the simultaneous expansion of lower-income employment and contraction of higher-income groups.

More broadly, our findings suggest that the expansion of digital platforms has important spatial and distributional consequences. Rather than reducing the importance of place, platform-based business models reorganize economic activity through geographically concentrated logistics infrastructures that reshape local labour markets. The resulting effects are spatially heterogeneous: wage losses are concentrated in municipalities served by DSs, whereas municipalities hosting FCs experience an expansion of lower-income employment without corresponding income gains. These findings contribute to the growing literature on the economic geography of digital platforms by showing that the organizational innovations underpinning e-commerce generate uneven local labour market adjustments rather than uniformly shared productivity gains.

While this article contributes to the growing literature on e-commerce and digital platforms, several limitations should be acknowledged. First, the analysis cannot distinguish labour market adjustments across sectors, preventing an assessment of whether the observed effects are concentrated in retail, logistics, manufacturing, or other industries. Second, the absence of representative municipality-level firm data precludes an analysis of business responses to Amazon's entry, including firm creation and exit, productivity changes, and investment behaviour. Third, although the analysis captures spatial heterogeneity through differences between facility types, it does not explicitly consider broader regional heterogeneity. Future research could examine whether regional economic structures and labour market institutions mediate the local effects of platform expansion.

Two policy implications follow from our findings. First, the expansion of digital platforms may require accompanying policies that facilitate labour market adjustment and support workers and firms facing increased competitive pressure,

particularly in urban areas where negative wage effects appear strongest. Second, ensuring that the benefits of platform investment are more broadly shared may require stronger labour market institutions. In particular, policies that enhance collective bargaining and extend labour protections across subcontracting chains may help address the fragmented employment relationships that characterize platform-based logistics networks and contribute to the persistence of low-paid employment.

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Appendix

Tables

Table A.1: Mean and standard deviation (in brackets) of labour market outcomes for municipalities without Milan - 2013

	Not present	Fulfillment Center	Delivery Stations	Total
Employees in municipality	1813 (4162)	1905 (3728)	7430 (39125)	2411 (13414)
Per capita wages	18145 (3603)	20009 (2632)	20387 (3091)	18471 (3594)
Number of income earners under 26,000 €	2890 (6117)	2698 (4926)	10373 (50759)	3672 (17612)
Per capita income for the 0-26k income bracket	12061 (1746)	13281 (1205)	12975 (1263)	12217 (1719)
Number of income earners between 26,000 € and 55,000 €	631 (1744)	728 (1701)	3163 (19402)	903 (6563)
Per capita income for the 26-55k income bracket	33369 (1807)	33635 (895)	33831 (864)	33431 (1704)
Number of income earners over 55,000 €	112 (388)	134 (503)	754 (6111)	181 (2030)
Per capita income for the 55-120k income bracket	70893 (36658)	78287 (28078)	82231 (21528)	72447 (35181)
Number of municipalities	6661 (84.6%)	378 (4.8%)	832 (10.6%)	7871 (100.0%)

Figures

Figure A.1: Typology of Amazon warehousing facilities, 2022

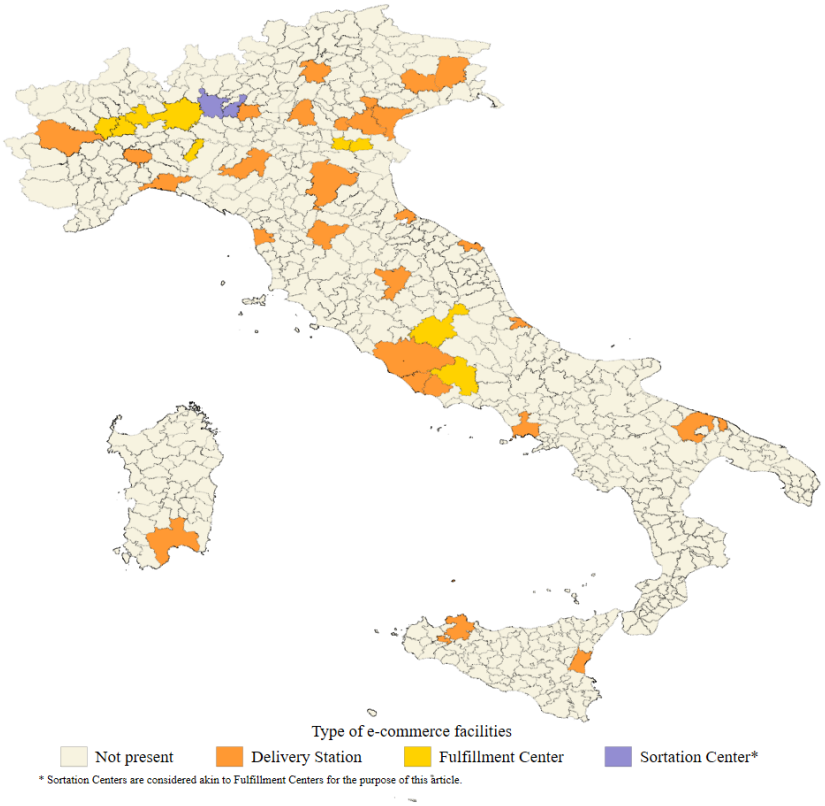
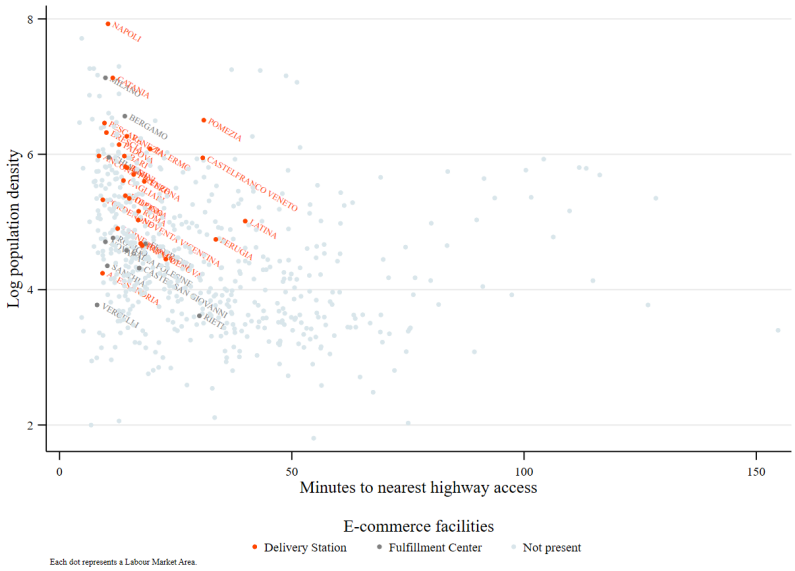
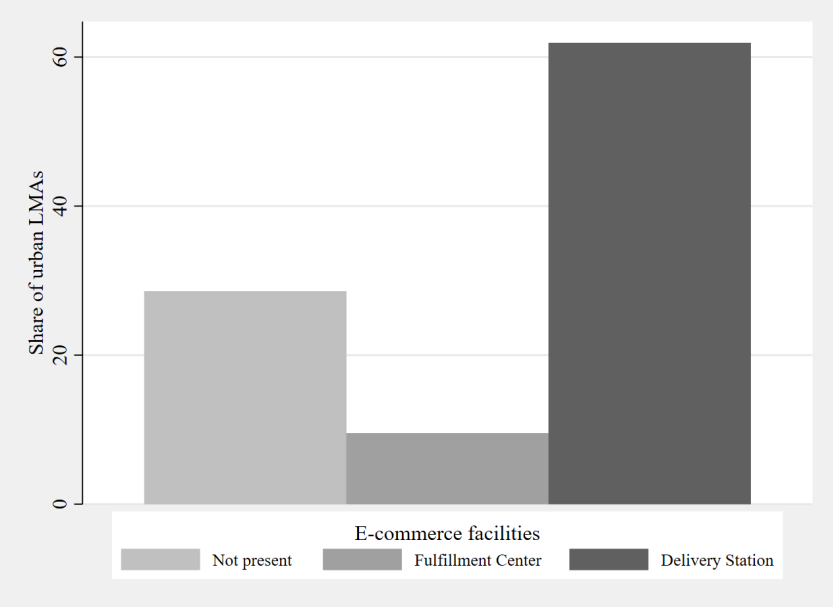


Figure A.2: Density and highway access by type of Amazon warehousing facilities



Source: Italian National Institute of Statistics. Minutes to highway are calculated using median time to highway access data. The methodology is defined at this link: https://tinyurl.com/IstatAuto

Figure A.3: Share of urban LMAs by type of Amazon warehousing facilities



Source: Italian National Institute of Statistics. Urbanicity (degree of urbanisation) is defined as a three-tiered item where 1 (Cities) represents areas in which 50% or more of the population lives in highly densely populated cell agglomerations. The methodology is defined at this link: https://tinyurl.com/IstatUrban

Figure A.4: Analysis of wage impact using a centroid distance measure

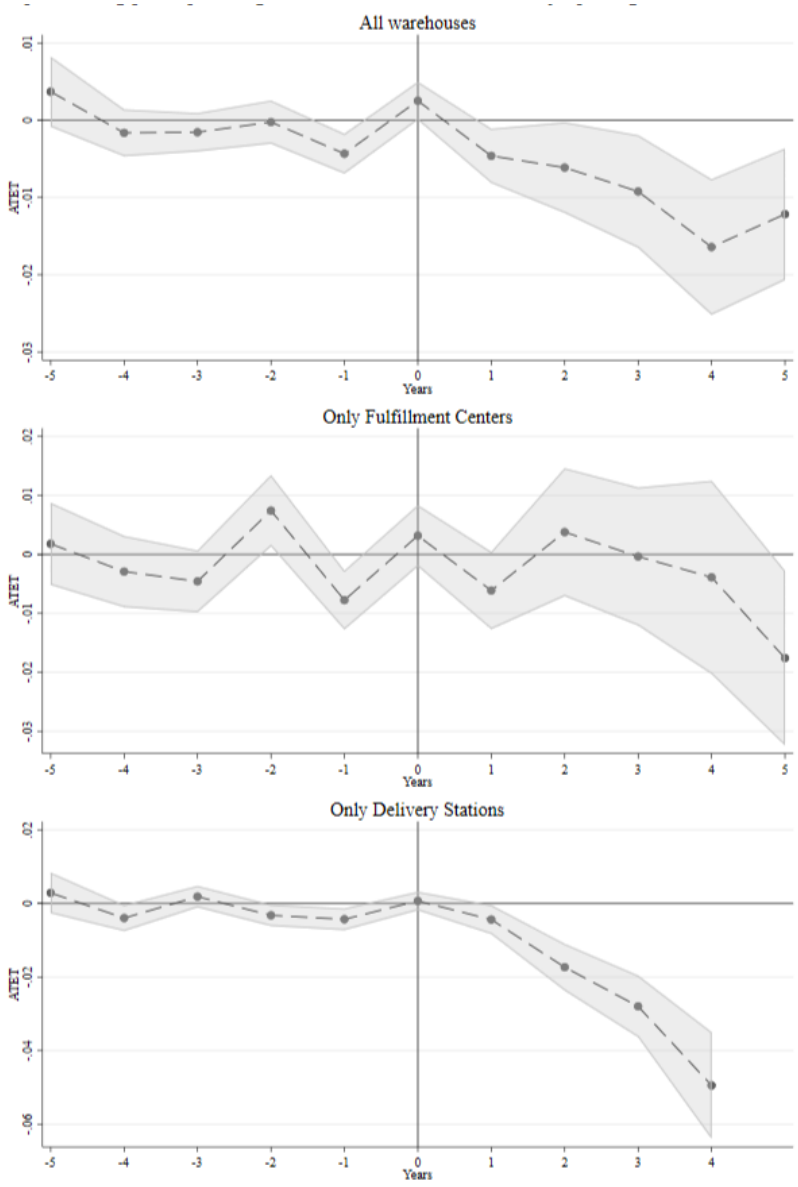


Figure A.5: Analysis of employment impact using a centroid distance measure

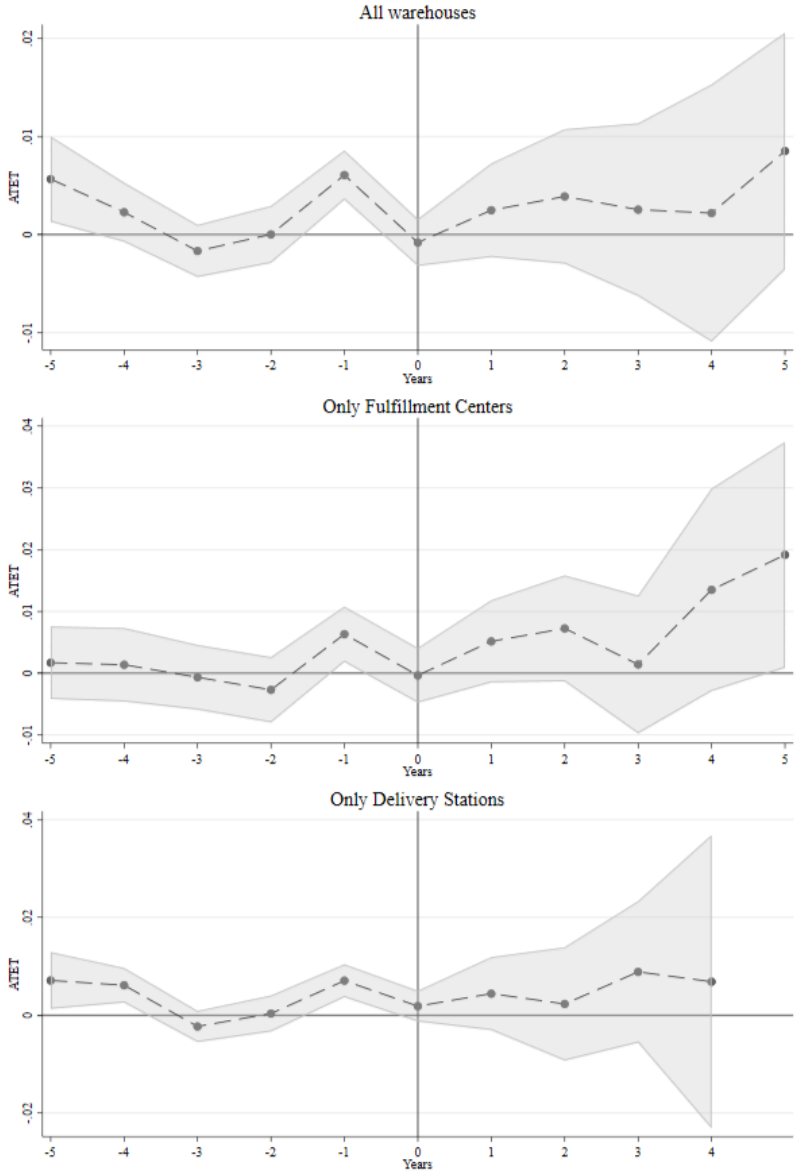


Figure A.6: Analysis of wage impact excluding the Milan Labour Market Area

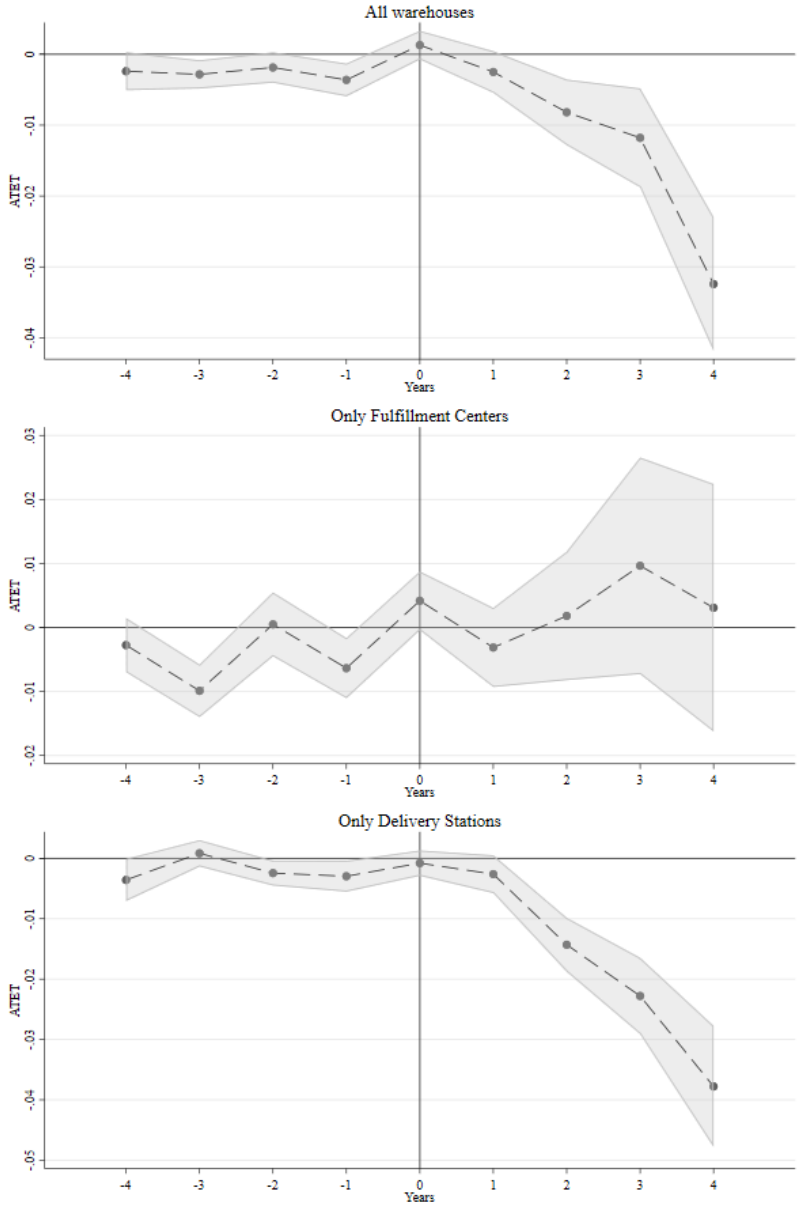


Figure A.7: Analysis of employment impact excluding the Milan Labour Market Area