How Amazon Shapes Local Labour Markets: Impacts on Wages, Jobs, and Income Distribution

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Abstract

E-commerce platforms have become increasingly pervasive, reshaping local labour markets. This study investigates the impact of Amazon's expansion in Italy—specifically the opening of Fulfillment Centers (FCs) and Delivery Stations (DSs)—on municipal-level wages and employment, using income tax data and a staggered difference-in-differences approach. The results reveal a net negative effect on both employment and per capita wages, particularly in areas near DSs. Municipalities hosting FCs experience an increase in low-income employment alongside a decline in high-income earners. These findings suggest that although e-commerce may generate jobs, likely in logistics, it simultaneously displaces higher-paying employment, contributing to wage polarization and raising concerns about the quality and distributional implications of this new employment.

Keywords: Amazon, e-commerce, event study, staggered difference-in-differences, Italy

JEL classification: J30, L81, O33

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1 Introduction

Digital platforms are widely regarded as one of the most significant developments in the economy over the past two decades. Companies such as Meta, Alphabet, Microsoft, and Amazon have profoundly transformed their respective industries and markets. Their business model centers on connecting users, producers, developers, and other market participants through a digital interface that consolidates a wide range of goods and services in a single space. By doing so, these platforms generate powerful network effects and have become indispensable to both economic actors and institutions. As a result, they hold substantial market shares in the sectors they operate in. Additionally, digital platforms have capitalized on — and contributed to — changes in the world of work, particularly in terms of flexibility. While this has enhanced value creation, it has also intensified trends toward job precarity and lower-quality employment (Garcia Calvo et al., 2023).

The presence of a digital platform can have two distinct effects on workers. The first is substitution: digital platforms often replace traditional intermediaries by internalizing functions and resources, typically relying on different types of workers or tasks than those displaced. The second effect is scale: platforms can expand economic activity by creating larger, more integrated markets for goods and services. As a central hub in these markets, the platform consolidates economic transactions. With significant power in both product and labor markets, it can exert downward pressure on wages for the workers it directly employs.

E-commerce platforms offer a valuable context for examining the effects of digital platforms on labour markets. The goods they sell or intermediate are also available in brick-and-mortar and chain retail stores, meaning their entry intro-

duces a competitive shock that can displace or reshape employment in traditional retail. At the same time, to fulfill orders, these platforms directly or indirectly generate employment in logistics and transportation, increasing labour demand in those sectors. This paper aims to estimate the net local impact of the entry of a major e-commerce platform—Amazon—on wages and employment. Indeed, Amazon.com Inc., through Amazon Italian Logistics S.r.l., is a leading actor in the sector and oversees the management of all Fulfillment Centers established in Italy [1].

While a number of primarily qualitative studies have examined the evolution of working conditions at Amazon and, more broadly, within the logistics sector (Benvegnù et al., 2018, Bonacich and Wilson, 2011, Cirillo et al., 2025b, Delfanti, 2021, Gutelius and Theodore, 2019), often highlighting the sector's relatively low levels of employment protection compared to manufacturing, few have provided quantitative evidence on the spatial impact of e-commerce platforms at a fine geographical scale (Chava et al., 2024). As such, the geographically contingent effects of e-commerce on labour markets remain underexplored. This omission is notable given that e-commerce may produce both localised and spatially uneven labour market outcomes. While brick-and-mortar retail establishments—particularly smaller ones—must locate close to consumer demand, logistics facilities such as warehouses face fewer spatial constraints. The expansion of e-commerce therefore implies not only sectoral shifts in employment, but also a partial redistribution of jobs from urban centres to peripheral or suburban areas.

From a labour market perspective, the redistribution associated with e-commerce

[1] A Fulfillment Center is the central node in Amazon's logistics network: a large warehouse where e-commerce products are received, stored, and prepared for shipment—that is, picked, packed, and loaded onto delivery vehicles.

extends beyond geography to encompass shifts between and within income classes. Lower-income earners may gain access to new employment opportunities in warehousing and logistics, provided that wages in these sectors exceed their outside options. At the same time, the expansion of e-commerce often leads to a decline in traditional retail employment—where many lower-wage jobs are concentrated—potentially exerting downward pressure on wages in that segment. Further, as markets expand and reconfigure around platform-based models, workers — frequently self-employed or employed by small firms — face growing competition from new entrants and reduced price–cost margins, contributing to wage suppression. Given these contrasting dynamics, the net effect of e-commerce platforms on local labour markets remains, ultimately, an empirical question.

In light of these considerations, this paper constitutes one of the first quantitative efforts to assess the impact of e-commerce on wages and employment within a European country. To this end, a unique dataset has been constructed by merging two primary sources of information. First, a list of Amazon facilities—including details on their location and the quarter of establishment—was obtained from MVPWL.com, a logistics consulting firm, and cross-validated through newspaper articles reporting facility openings. Larger facilities are referred to as Fulfillment Centers, while smaller urban-oriented sites are known as Delivery Stations. Second, publicly available data from personal income tax filings, maintained by the Italian Ministry of Economy and Finance and aggregated at the municipal level, provide annual information on average wages and the number of wage-earners across all Italian municipalities from 2013 to 2023.

Moreover, to identify which municipalities are affected by the platform's presence, each is classified based on whether it falls within the 2011 EU Labour Market Area

(LMA, Sistemi Locali del Lavoro) of the municipality hosting an Amazon facility.[2] LMA boundaries are obtained from the Italian National Institute of Statistics (ISTAT).

Using a difference-in-differences framework with staggered adoption and not-yet-treated controls, the analysis reveals that, on average, the opening of a new e-commerce facility has a -0.013 negative effect on log per-capita wages in any given year-municipality. The dynamic effect intensifies over time: four years post-opening, per-capita wages in treated municipalities are 0.034 log points lower, corresponding to annual losses between 711€ and 775€ per capita. Similarly, log employment declines by 0.037 points, with treated municipalities experiencing between 148 and 175 fewer employees on average after four years.

However, the analysis also reveals that the impacts of e-commerce vary between urban and peripheral facilities. More specifically, the establishment of a new Fulfillment Center is less strongly associated with declines in wages and employment. In contrast, urban Delivery Stations appear to drive the long-term negative effects of e-commerce, with both wages and employment decreasing in these areas. This difference can be explained by the distinct characteristics of the two facility types. Fulfillment Centers are typically located farther from cities, in commuting zones where location decisions are influenced less by population density or income levels and more by factors such as access to a suitable labour pool and proximity to major highways. These are large facilities, employing between 800 and 1,200 workers. Conversely, urban Delivery Stations are smaller and employ fewer workers. They serve to enable rapid delivery in premium urban areas, where competition with an already abundant retail sector is more pronounced.

[2]The first facility opening in the sample occurs in 2015, and the most recent one in 2022.

Focusing on income distribution, the empirical analysis reveals that municipalities hosting Fulfillment Centers experience an increase in the number of low-wage earners—taxpayers in the 0–26,000 euro bracket—although their incomes tend to decline. Conversely, among the highest earners—those in the 55,000+ euro bracket—such municipalities exhibit a reduction in the number of taxpayers, with no significant change observed in average income within this group. For the middle-income bracket (26,000–55,000€), changes in the number of taxpayers are smaller, and income levels remain stable.[3] Overall, the main analysis indicates that e-commerce is associated with reductions in employment and declines in wages. These effects are particularly pronounced in municipalities near urban areas, especially those hosting Delivery Stations. In contrast, the impact of labour market power—which might be expected to be stronger in more dispersed and less elastic labour markets, such as those surrounding Fulfillment Centers—appears less significant at the aggregate level. Examining income brackets, e-commerce seems to have increased employment among lower-income earners in municipalities with Fulfillment Centers, while reducing the number of taxpayers in the highest income bracket (over 55,000€). This pattern aligns with the interpretation that e-commerce exerts downward pressure on wages.

Two main robustness checks have been performed to validate these findings. For instance, given that the definition of commuting zones by ISTAT may not perfectly capture the municipalities affected by a facility's presence, an alternative analysis was conducted considering municipalities within a 50 km radius from the

[3]Income brackets provided by the Ministry of Economy and Finance, reflecting Italy's progressive tax rates, are as follows: below 0, 0–10,000 €, 10–15,000 €, 15–26,000€, 26–55,000€, 55–75,000€, 75–120,000€, and over 120,000€. Due to likely misreporting, the lowest and highest brackets are excluded, and the first three and last two brackets are aggregated, resulting in the 0–26, 26–55, and 55–120 brackets used here.

centroid of the municipality hosting the e-commerce facility as treated. The results remain qualitatively unchanged, providing reassurance about the accuracy of the empirical strategy. Additionally, since the Milan commuting zone is classified as a Fulfillment Center and might potentially bias the estimates, regressions were re-run excluding this zone. No substantive changes were detected, confirming that this labour market area was not driving the results.

The remainder of this article proceeds as follows. The next section reviews the main contributions on e-commerce and related fields stating our research questions. Section 3 details the data sources and outlines the methodology. Results are presented in Section 4, and Section 5 offers discussion and concluding remarks.

2 Setting the scene: literature review and research questions

This article contributes to the literature on the economic effects of e-commerce by bridging two main research streams: the impact of e-commerce on market structure and industry dynamics, and the labour outcomes associated with new digital technologies, particularly digital platforms.

On the first line of analysis, most existing empirical research has focused on consumer behavior, market dynamics, and welfare outcomes, suggesting that e-commerce lowers prices for homogeneous goods, enhances consumer welfare—partly through increased access to products—and reduces price dispersion (Brynjolfsson et al., 2010, Brynjolfsson and Smith, 2000, Ghose et al., 2006, Ghose and Yao, 2011). More specifically, e-commerce is believed to improve consumer welfare by

enabling consumers to switch to online merchants that offer higher-quality products at lower prices (Dolfen et al., 2023, Goldmanis et al., 2010).

Continuing along this line of research, several studies have highlighted the interrelationship between market structure and geographical factors in assessing the effects of e-commerce on local labour markets. The impact of e-commerce platforms on urban retail sales and employment has been shown to vary based on factors such as platform market power, self-preferencing practices, and the degree of local embeddedness (An and Chung, 2025, Farronato et al., 2023, Waldfogel, 2024). As a result, scholars have emphasized the critical role of geography, worker skill levels, and consumer preferences in shaping platform location strategies, which in turn influence the distributional effects of e-commerce on both firms and workers (Bar-Isaac et al., 2012, Brynjolfsson et al., 2009, Forman et al., 2009, 2012).

As a second stream of research, focusing specifically on labour, other studies have highlighted that digital platforms tend to create employment primarily in logistics and transportation, while contributing to job losses in the retail sector. A similar pattern applies to wages at the local level (Bauer and Fernández Guerrico, 2023, Chava et al., 2024).

More broadly, the empirical labour literature has found that new digital technologies are associated with rising productivity, alongside increasingly polarized outcomes for workers (Acemoglu and Autor, 2011, Acemoglu and Restrepo, 2020). These outcomes vary depending on workers' skill levels, employment contract stability, and the orientation and focus of technological change (Cirillo et al., 2025a, 2021).

In the context of the retail industry, previous research suggests that the entry of large "Supercenter"-type retailers has significant local impacts on retail em-

ployment, small businesses, and communities. These effects often include wage reductions and business closures, as local firms struggle to compete with major retail chains (Holmes, 2011, Mihaescu et al., 2024, Wiltshire, 2022). Similar research within a European context has examined the expansion of a large furniture manufacturer. In that case, however, the net effects appear to have been largely positive (Daunfeldt et al., 2017).

From a geographical perspective, most empirical research on these issues has concentrated on the United States, with relatively few studies examining the effects of e-commerce in Europe (Biagi and Falk, 2017) or in non-Western contexts. Notable exceptions include recent work by Chun et al. (2023) and Choe et al. (2024), which analyze the impact of e-commerce across urban and rural areas in South Korea.[4]

In contrast to previous research, this paper focuses on a single country—Italy—where digital platforms have played a significant role in reorganizing productive factors and value chains across industries such as retail, restaurants, and hospitality (Cirillo et al., 2025a, Guarascio and Sacchi, 2018). To the best of our knowledge, this study constitutes the first empirical attempt to estimate the impact of e-commerce, represented by the opening of Amazon facilities, on wages and employment within a European context. Unlike prior studies, which have predominantly concentrated on retail employment, this article examines the broader municipal labour force. Two main research questions are tested, grounded in two distinct premises.

The first issue concerns the differential effects of e-commerce on rural versus urban labour markets. E-commerce is highly reliant on logistics, which has evolved in recent years into a two-tiered system: large, labour-intensive warehouses that

[4]Addressing the urban–rural divide, these studies find that e-commerce is associated with a sustained decline in retail employment in non-metropolitan areas and with wage losses in urban contexts.

receive goods from ports and airports, and smaller facilities responsible for the final distribution to consumers. The former, commonly referred to as Fulfillment Centers, are typically located in peripheral or rural areas, a locational pattern shaped by factors such as lower land costs, proximity to major highways, and the availability of cheaper, lower-skilled labour (Cattero and D'Onofrio, 2018, Fried and Goodchild, 2023, Kang, 2020, Risberg, 2023, Rodrigue, 2020). Delivery Stations, by contrast, are smaller facilities located closer to urban centers, designed to handle the last-mile delivery process efficiently.

The second issue arises from the understanding that structural transformations—such as those triggered by the expansion of e-commerce—generate heterogeneous effects across different segments of the labour market. Labour market polarization has been closely linked to the diffusion of digital technologies (Acemoglu and Autor, 2011, Autor et al., 2020). E-commerce may contribute to this trend by increasing the number of low-wage, low-skill jobs in warehousing,[5] while simultaneously displacing independent shopkeepers and their employees (Choe et al., 2024, Cirillo et al., 2024b). Grounded in these considerations and building on prior literature, we formulate the following research questions:

RQ1: *What is the impact of the opening of a new Amazon facility on municipal-level wages and employment? To what extent do these effects differ between Fulfillment Centers and Delivery Stations?*

RQ2: *How does the opening of a new Amazon facility affect the number of earners and average wages across different income levels? Are these effects consistent along the wage distribution, or do they differ between low-, middle-, and high-*

[5]Particularly when combined with technologies used to enhance, monitor, or substitute worker performance (Baiocco et al., 2022, Cirillo et al., 2024a).

income earners?

3 Data and empirical strategy

3.1 Data

To examine the impact of e-commerce on wages and employment, we construct a novel municipality-level dataset that combines detailed information on the opening of new Amazon facilities with key labour market indicators. More in detail, to proxy the rise in e-commerce activity in Italy, we compile a comprehensive list of Amazon's logistics centres—the country's dominant e-commerce operator—sourced from a logistics consulting firm. This publicly available data has previously been used in studies focused on the United States (Bauer and Fernández Guerrico, 2023, Chava et al., 2024). We validate each entry through cross-referencing with local newspaper reports that typically announce new warehouse openings in conjunction with expected job creation. Between 2011 and 2023, Amazon opened 57 such facilities across Italian municipalities. We exclude the first opening, as it falls outside the scope of our data. We further exclude facilities opened within already treated LMAs, as these do not introduce additional treated municipalities. Facilities inaugurated in 2023 are also dropped, given the absence of a post-treatment period.

As previously stated, facilities can be Fulfillment Centers or Delivery Stations, with different characteristics in terms of the socio-economic characteristics of the municipalities involved. Delivery Stations are closer to cities, enabling fast shipping; Fulfillment Centers are mostly used for bulk logistics operations, are conveniently

closer to highways and removed from cities to compress land and labour input costs. For the purposes of this analysis, we then classify Sortation Centers as Fulfillment Centers, given their comparable characteristics in terms of wages, employment, and geographic location. Our final sample comprises 37 facility openings across distinct commuting zones over the 2015–2022 period.[6]

We then link these facility openings at the municipal level to income tax data from the Italian Ministry of Economy and Finance, which provide annual information on total labour income (gross wages) and the number of wage earners (employees) in each municipality for the period 2013–2023. Wages are defined as income earned from subordinate employment. Disposable income deriving from a multiplicity of sources is instead the basis for the definition of taxable income brackets. To define treated municipalities, we adopt the concept of Labour Market Areas (LMAs) as established by the Italian National Institute of Statistics, based on the 2011 census and harmonized at the EU level.[7] An LMA is defined as a functional area in which at least 80% of the employed population commutes within the boundaries of its constituent municipalities. Treatment is assigned at the LMA level rather than at the level of individual municipalities, as the proximity of a new facility is expected not only to generate local employment opportunities but also to enhance delivery efficiency by reducing shipping times, thereby affecting local labour markets more broadly (Chava et al., 2024).

[Table 1]

[6]To account for potential anticipation effects, we treat facilities opened in the third quarter of a given year as opening in the following calendar year.

[7]Eurostat – European Harmonised Labour Market Areas: Methodology on Functional Geographies with Potential, 2020 edition, `https://ec.europa.eu/eurostat/web/products-statistical-working-papers/-/ks-tc-20-002`

As Table 1 shows, municipalities that host an Amazon facility differ systematically from those that do not. On average, they have a larger number of employees and higher per-capita wages. The shares of both low- and high-income earners are also higher, while the number of middle-income earners does not differ significantly [8].

From a geographical perspective, Figure 1 shows that Fulfillment Centers and Sortation Centers tend to be based in the North, and in municipalities located in labour market areas farther away from main cities. Instead, Delivery Stations signal Amazon presence for fast shipping near almost all cities over 100.000 inhabitants[9]

[Figure 1] [Figure 2]

Moreover, Figure 2 depicts the temporal and spatial evolution of Amazon's expansion across Italy. The platform initially concentrated its growth in the North and in the area surrounding the capital, Rome, before extending its network—primarily via Delivery Stations—to major cities in the Centre and South. These spatial and temporal heterogeneities are explicitly accounted for in the empirical analysis through the identification strategies and controls employed as we will detail in the next subsection.

[8]Table A.1 in the Appendix reports descriptive statistics excluding Milan. Removing Milan reveals additional heterogeneities: municipalities hosting a Fulfillment Center appear more similar to non-treated municipalities, except in terms of per-capita wages, which remain persistently higher. These patterns reflect Amazon's strategy of locating Fulfillment Centers near peripheral municipalities, yet predominantly within the wealthier North of Italy, where approximately 46% of the national population resides.

[9]Main exceptions are Salerno, Foggia, Taranto, Reggio Calabria, Messina, and Sassari, all located in the South and Islands.

3.2 Methodology

In order to estimate the impact of a new e-commerce facility on local per-capita wages and on the local number of employees, we apply an event-study approach (Callaway and Sant'Anna, 2021). This strategy entails aggregating the results of separate difference-in-differences regressions, estimating the impact of each facility (event) on a given territory, in a given year. During aggregation, the effects of estimating the impact in different years and for different units (municipalities) are meted out, allowing the retrieval of the dynamic impact over time of a new Amazon facility, as well as the static year-time effect (the overall measure, shown in table 2 and 3).

An issue with this method is that the control municipalities, for which the event did not occur, may have unobservable characteristics correlated with the choice of Amazon not to locate there. Thus, not-yet-treated municipalities are used as controls. These are municipalities scheduled to receive a facility in future periods but untreated in the year corresponding to the estimated treatment cohort. Employing not-yet-treated municipalities as controls helps mitigate concerns related to spatial correlation and potential self-selection bias, as the e-commerce platform does not randomly choose its locations. Instead, site selection tends to favour areas with large consumer markets and convenient access to major highways (see figures A2 and A3 in the Appendix).

We estimate the following equation:

$$ATT_{c,t} = \alpha + \beta PostAmazon_{c,t \geq g} + \Phi_c + \Theta_t + \epsilon_{c,t} \tag{1}$$

where $ATT_{c,t}$ denotes the average treatment effect on the treated for the outcome

variables in municipality c in year t; *PostAmazon* is a binary indicator equal to 1 if the municipality belongs to an LMA where an e-commerce facility is present in year $t \geq g$, with g indicating the year of the facility's opening; Φ_c represents municipality-fixed effects; Θ captures time fixed effects; and ϵ represents doubly robust inverse-probability-weighted errors, computed using a wild bootstrap procedure (Rios-Avila et al., 2021).

In order to reply to *RQ1* and *RQ2*, equation 1 has six different outcomes, estimated across three different reference populations.

To answer *RQ1*, we regress the log of the wage and the log of the number of income earners. We do so first with the full sample of Amazon facilities; second, we split the sample between municipalities impacted by a Fulfillment Center and those impacted by a Delivery Station.

As said the observed effects of e-commerce may not be driven by changes in local labour market conditions per se, but by shifts in the composition of the local workforce. To address this, it is crucial to analyze the number of taxpayers across different income brackets as additional outcome variables (*RQ2*). When combined with data on total income within each bracket, this approach allows us to assess the distributional impacts of e-commerce expansion.

To address *RQ2*, we regress first the log of the number of income earners in the three brackets we have identified, and we do so jointly for all facilities and separately thereafter. We then regress the log of the average income in each income bracket, in the same manner.

Additionally, although recent research suggests that zones of consumption are smaller than commuting zones (Batch et al., 2025), partly alleviating concerns related to treatment misclassification, LMAs may still imperfectly capture the true

area of impact of e-commerce expansion. To address this, we conduct a robustness check in which treatment is redefined based on geographic proximity: for both urban (Delivery Station) and peripheral (Fulfillment Center) areas, we consider as treated all municipalities located within 50 kilometers of the municipality hosting the facility.[10] Lastly, given that Milan —Italy's most urbanized LMA— is classified as hosting a Fulfillment Center, we repeat the analysis excluding this event to test the sensitivity of our results.

4 Results

The average impact of new e-commerce facilities on wages and employment appears to be negative. However, this effect is not uniform: municipalities located near a Fulfillment Center do not experience declines in wages or employment. In contrast, municipalities near a Delivery Station do face such negative impacts.

[Table 2] [Table 3]

More specifically, the baseline estimates indicate a decrease of 0.013 log points in the average wage in the static aggregation, across years and municipalities. When examining the impact dynamically, the effect appears to grow over time. By the fourth year following the establishment of the facility, the average wage in treated municipalities declines by more than 0.03 log points. In municipalities hosting a Delivery Station, the decline is twice as large (see Figure 3).

This trend is mirrored by similar decreases in employment (see Figure 4). On average, a new e-commerce facility leads to a 0.03 log point reduction in the number

[10]Distances are calculated using the geographic centroids of municipalities. Specifically, treatment is assigned based on whether the centroid of a given municipality falls within a 50-kilometer radius of the centroid of the municipality where the facility is located.

of employees in treated municipalities. This effect is statistically significant only in municipalities affected by the opening of a Delivery Station, where employment drops by 0.04 log points.

Looking at the longer-term impact, employment declines by 0.08 log points after four years, and by as much as 0.11 log points in municipalities with a Delivery Station.

Taking stock of this evidence, we can assess that a new Amazon facility decreases wages and employment when it is close to urban labour markets, likely reflecting the impact of the platforms on shifts in consumption patterns.

[Figure 3] [Figure 4]

Focusing on *RQ2*, Table 4 shows that the number of income earners in the lowest bracket (0–26,000 €) increases in municipalities where a Fulfillment Center has opened. The opposite trend is observed in municipalities treated with a Delivery Station, as well as across higher income brackets. Notably, the highest income bracket — those earning above 55,000 € € shows the most significant decline. Concerning the impact on average income by bracket (Table 5), results indicate a general decrease in income levels. In municipalities with a Fulfillment Center, this decline is limited to the lowest income bracket. In contrast, Delivery Stations are associated with reductions across all income brackets. The least affected group is the middle-income bracket, comprising individuals earning between 26,000 € and 55,000 €.

[Table 4] [Table 5]

In light of the results, we can assess that Amazon has compressed the income distribution by reducing relatively more the number of income earners in the higher

brackets (see also Figures A.3 and A.4 in the Appendix). Concerning Fulfillment Centers, the process even shows a reversal, with the number of earners under 26,000 € increasing. For this group the decrease in income is significant even in municipalities with a Fulfillment Center.

4.1 Robustness checks

As anticipated in Section 3.2, consumption zones may differ from commuting zones. Therefore, as a robustness check, we estimate the impact of the opening of a new e-commerce facility using an alternative method to identify treated areas. Specifically, we define treated zones as those within a 50 km radius of the centroid of the municipality where the facility was opened. This approach yields qualitatively similar results, reinforcing the validity of the choice of Local Labor Market Areas (LMAs) to identify the treatment. A comparable outcome is obtained when the analysis is repeated excluding Milan as a Fulfillment Center.

The 50km radius treatment identification, combined with the use of not-yet-treated controls, relies on less observations than the LMA approach. Nonetheless, results indicate quite clearly that the magnitude and direction of the impacts hold. For the wages equation, the impact of Amazon is a decline of 0.012 log points in municipalities within a 50km radius from the one in which the platform is established. The impact is driven and larger in municipalities within 50km of a Delivery Station (Table A.2 in the Appendix). For the employment equation, Amazon affects the log of the number of employees negatively by 0.04 log points, and by 0.066 log points in municipalities close to a Delivery Station, which drive

the effect (Table A.3 in the Appendix). In both the wage and the employment equation, the impacts for Delivery Stations appear to be stronger than in the LMA identification, pointing to the fact that some spatial spillovers may go beyond traditionally defined LMAs. Dynamic effects (Figures A.5 and A.6 in the Appendix) also resemble the impacts documented in the main analysis. The main difference lies in the wider confidence bands for the log of the number of employees, which tend to become larger over time. The trend also becomes flatter, indicating that the employment impact may fade away after some time.

Removing Milan from the list of centers does not qualitatively alter the results. The Milan Fulfillment Center is also the first one in our considered sample, thus reducing the pre-trend years in the aggregation from 5 to 4. Still no impact is detected concerning FCs, while the overall estimate on the log number of employees indicates a slightly lower loss (Tables A.4 and A.5 in the Appendix).
These results show that the impact does not depend from a single warehousing facility or geographical pattern, and it is only mildly sensitive to alternative identification strategies, further reassuring us of the estimates' validity.

5 Discussion and conclusion

This article provides evidence on the net impact of e-commerce on wages and employment in Italy. It leverages the staggered rollout of warehouses by the leading e-commerce platform in Italy—Amazon—to identify these effects. Consistent with prior research (Bauer and Fernández Guerrico, 2023, Chava et al., 2024, Chun et al., 2023), our findings indicate that e-commerce has had a negative impact on labour markets. Specifically, the results suggest that e-commerce platforms

exert a negative local effect on both wages and employment. Using an event study approach applied to a unique municipality-level dataset, we find that this impact is likely driven primarily by the substitution of existing jobs with lower-paying ones. While detailed sector-level data on wages and employment are unavailable for each municipality or Local Labor Market Area (LMA), it is reasonable to infer that e-commerce predominantly generates new jobs in logistics and transportation, while simultaneously competing with traditional brick-and-mortar retail stores (Chava et al., 2024, Chen and Tsai, 2023).

When focusing on the specific characteristics of e-commerce facilities, our estimates reveal substantial heterogeneity. More specifically, Delivery Stations, located closer to urban centres, drive the impact. Urban labour markets are relatively more elastic with respect to rural areas. They also tend to host more establishment related to consumption, such as brick-and-mortar stores. The fact that the impact of Amazon is driven by such municipalities implies, then, that the main effect at play is one of substitution between online and offline sales.
Municipalities close to Fulfillment Centers, instead, do not show significant impacts. In Fulfillment Centers, Amazon locates most logistics jobs. These are also located in less central hubs for retail demand. This implies that, on average, the impact of Amazon should be one of job creation. Amazon should, also, have an impact as an employer in the long run, as it reconfigures around itself the demand for logistics services. This would result in some form of labour market power in municipalities with lower elasticity of labour supply, which provide less job opportunities outside the platform. However, the net effects on wages and employment in these areas are not negative.

The decomposition of the impact reveals a differential effect across income brackets: the decline in the number of taxpayers in the highest-income bracket is twice as large as in the middle-income bracket, and six times larger than in the lowest-income bracket. Within each bracket, both lower-income earners and higher-income earners experience the most significant income reductions in treated municipalities.

For lower-income earners, wage declines appear to stem from the e-commerce platform's dominance and its reshaping of local labor markets. This pattern is particularly evident in municipalities close to a Fulfillment Center, where the number of low-income earners increases, while their average income declines. This suggests that the platform's hiring practices and its control over demand play a role in driving these outcomes. Even as the platform, with its Fulfillment Centers, does not have a net negative effect on wages, its impact is evident when looking at the dynamics of income, which lead to a replacement of higher-paying forms of earning with lower-paying ones.

Taking stock jointly of the evidence, it would appear that the negative impact of e-commerce on jobs is mostly a urban phenomenon (Choe et al., 2024). However, significant heterogeneities emerge in the distribution of income in municipalities close to a Fulfillment Center.

While this article offers a valuable contribution to the growing literature on e-commerce and digital platforms, several limitations must be acknowledged. First, the analysis does not differentiate between sectors or types of employment, which constrains our ability to assess sector-specific effects. For instance, we cannot disentangle whether job losses or wage changes are concentrated in retail, manufacturing, or other industries potentially affected by the expansion of e-commerce.

This limits the granularity of our findings and their applicability to targeted labour market policies. Second, the study does not include firm-level data, preventing the analysis of local business responses to the entry of large e-commerce platforms. Without firm-level information, we cannot explore changes in firm creation or closure rates, productivity shifts, or strategic responses by incumbents, such as investment in digital technologies or changes in employment practices. This limitation arises from the absence of representative firm-level data at the municipality level. Third, while we account for spatial variation through the urban/peri-urban divide, the analysis lacks a macro-regional perspective. Regional economic structures and labour market institutions differ significantly across the country, potentially mediating the effects of e-commerce in important ways. Incorporating this perspective could help reveal whether some regions are more resilient or more vulnerable to platform-driven economic changes. Addressing these limitations would require access to richer administrative datasets, including sectoral employment, firm-level performance, and regional economic indicators. Such data would allow for a more nuanced understanding of the mechanisms at play and support more targeted policy recommendations.

References

Acemoglu, D. and Autor, D. (2011). Skills, tasks and technologies: Implications for employment and earnings. In *Handbook of labor economics*, volume 4, pages 1043–1171. Elsevier.

Acemoglu, D. and Restrepo, P. (2020). Robots and jobs: Evidence from us labor markets. *Journal of political economy*, 128(6):2188–2244.

An, B. Y. and Chung, J. (2025). Who bears the brunt of disruptive innovation? the effect of grocery e-commerce on local retail competitors. *Journal of Regional Science*, 65(3):843–865.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., and Van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics*, 135(2):645–709.

Baiocco, S., Fernández-Macías, E., Rani, U., and Pesole, A. (2022). The algorithmic management of work and its implications in different contexts. Technical report, JRC Working Papers Series on Labour, Education and Technology.

Bar-Isaac, H., Caruana, G., and Cuñat, V. (2012). Search, design, and market structure. *American Economic Review*, 102(2):1140–1160.

Batch, A., Bridgman, B., Dunn, A., and Gholizadeh, M. (2025). Consumption zones. *Journal of Economic Geography*, 25(2):191–213.

Bauer, A. and Fernández Guerrico, S. (2023). Effects of e-commerce on local labor markets. *IZA Discussion Paper*.

Benvegnù, C., Haidinger, B., and Sacchetto, D. (2018). Restructuring labour relations and employment in the european logistics sector. *Reconstructing solidarity: labour unions, precarious work, and the politics of institutional change in Europe*, pages 83–103.

Biagi, F. and Falk, M. (2017). The impact of ict and e-commerce on employment in europe. *Journal of Policy Modeling*, 39(1):1–18.

Bonacich, E. and Wilson, J. B. (2011). *Getting the goods: Ports, labor, and the logistics revolution*. Cornell University Press.

Brynjolfsson, E., Hu, Y., and Rahman, M. S. (2009). Battle of the retail channels: How product selection and geography drive cross-channel competition. *Management Science*, 55(11):1755–1765.

Brynjolfsson, E., Hu, Y. J., and Smith, M. D. (2010). The longer tail: The changing shape of amazon's sales distribution curve. *Available at SSRN 1679991*.

Brynjolfsson, E. and Smith, M. D. (2000). Frictionless commerce? a comparison of internet and conventional retailers. *Management science*, 46(4):563–585.

Callaway, B. and Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of econometrics*, 225(2):200–230.

Cattero, B. and D'Onofrio, M. (2018). Organizing and collective bargaining in the digitized "tertiary factories" of amazon: A comparison between germany and italy. *Working in Digital and Smart Organizations: Legal, Economic and Organizational Perspectives on the Digitalization of Labour Relations*, pages 141–164.

Chava, S., Oettl, A., Singh, M., and Zeng, L. (2024). Creative destruction? impact of e-commerce on the retail sector. *Management Science*, 70(4):2168–2187.

Chen, N. and Tsai, H.-T. (2023). Steering via algorithmic recommendations. *The RAND Journal of Economics*.

Choe, C., Kang, D., and Lee, H. (2024). The impact of e-commerce on local retail employment: Examining heterogeneous impacts by employment and regional types. *Global Economic Review*, 53(2):99–115.

Chun, H., Joo, H. H., Kang, J., and Lee, Y. (2023). E-commerce and local labor markets: Is the "retail apocalypse" near? *Journal of Urban Economics*, 137:103594.

Cirillo, V., Cutolo, D., Guarascio, D., Kenney, M., and Tramontano, J. (2025a). Leveraging workforce flexibility to navigate platform-induced uncertainty: A study of the italian restaurant and hospitality sectors. Technical report, Department of Economics and Law, Sapienza University of Roma.

Cirillo, V., Evangelista, R., Guarascio, D., and Sostero, M. (2021). Digitalization, routineness and employment: An exploration on italian task-based data. *Research Policy*, 50(7):104079.

Cirillo, V., Massimo, F. S., Rinaldini, M., and Staccioli, J. (2025b). Logistics under automation and digitalisation: How technology displaces human work. In *Technology and Work in Services: Vulnerable Workers under Automation and Digitalisation*, pages 35–64. Springer.

Cirillo, V., Massimo, F. S., Rinaldini, M., Staccioli, J., and Virgillito, M. E.

(2024a). Monopoly power upon the world of work: A workplace analysis in the logistics segment under automation. *Review of Political Economy*, pages 1–33.

Cirillo, V., Mina, A., and Ricci, A. (2024b). Digital technologies, labor market flows and training: Evidence from italian employer-employee data. *Technological Forecasting and Social Change*, 209:123735.

Daunfeldt, S.-O., Mihaescu, O., Nilsson, H., and Rudholm, N. (2017). What happens when ikea comes to town? *Regional studies*, 51(2):313–323.

Delfanti, A. (2021). *The warehouse*. Pluto Press London.

Dolfen, P., Einav, L., Klenow, P. J., Klopack, B., Levin, J. D., Levin, L., and Best, W. (2023). Assessing the gains from e-commerce. *American Economic Journal: Macroeconomics*, 15(1):342–370.

Farronato, C., Fradkin, A., and MacKay, A. (2023). Self-preferencing at amazon: evidence from search rankings. In *AEA Papers and Proceedings*, volume 113, pages 239–243. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.

Forman, C., Ghose, A., and Goldfarb, A. (2009). Competition between local and electronic markets: How the benefit of buying online depends on where you live. *Management science*, 55(1):47–57.

Forman, C., Goldfarb, A., and Greenstein, S. (2012). The internet and local wages: A puzzle. *American Economic Review*, 102(1):556–575.

Fried, T. and Goodchild, A. (2023). E-commerce and logistics sprawl: A spatial exploration of last-mile logistics platforms. *Journal of Transport Geography*, 112:103692.

Garcia Calvo, A., Kenney, M., and Zysman, J. (2023). Understanding work in the online platform economy: the narrow, the broad, and the systemic perspectives. *Industrial and corporate change*, 32(4):795–814.

Ghose, A., Smith, M. D., and Telang, R. (2006). Internet exchanges for used books: An empirical analysis of product cannibalization and welfare impact. *Information Systems Research*, 17(1):3–19.

Ghose, A. and Yao, Y. (2011). Using transaction prices to re-examine price dispersion in electronic markets. *Information Systems Research*, 22(2):269–288.

Goldmanis, M., Hortaçsu, A., Syverson, C., and Emre, Ö. (2010). E-commerce and the market structure of retail industries. *The Economic Journal*, 120(545):651–682.

Guarascio, D. and Sacchi, S. (2018). Digital platform in italy. an analysis of economic and employment trends. *Policy Brief*, 8.

Gutelius, B. and Theodore, N. (2019). The future of warehouse work: Technological change in the us logistics industry.

Holmes, T. J. (2011). The diffusion of wal-mart and economies of density. *Econometrica*, 79(1):253–302.

Kang, S. (2020). Why do warehouses decentralize more in certain metropolitan areas? *Journal of Transport Geography*, 88:102330.

Mihaescu, O., Korpi, M., and Öner, Ö. (2024). Does new shopping centre development benefit or harm the local suburban market? heterogeneous effects from shopping centre type and distance. *The annals of regional science*, 73(3):1339–1363.

Rios-Avila, F., Callaway, B., and Sant'Anna, P. (2021). csdid: Difference-in-differences with multiple time periods in stata. In *Stata Conference*, page 47.

Risberg, A. (2023). A systematic literature review on e-commerce logistics: towards an e-commerce and omni-channel decision framework. *The International Review of Retail, Distribution and Consumer Research*, 33(1):67–91.

Rodrigue, J.-P. (2020). The distribution network of amazon and the footprint of freight digitalization. *Journal of Transport Geography*, 88.

Waldfogel, J. (2024). Amazon self-preferencing in the shadow of the digital markets act. Technical report, National Bureau of Economic Research.

Wiltshire, J. (2022). Walmart supercenters and monopsony power: How a large, low-wage employer impacts local labor markets. *Working paper,*.

Tables

Table 1: Descriptive statistics for municipalities, 2013

	Not present	Fulfillment Center	Delivery Stations	Total
Number of municipalities	6,661 (82.8%)	552 (6.9%)	832 (10.3%)	8,045 (100.0%)
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 0-26k 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 26-55k 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 55-120k income bracket	70893 (36658)	82578 (25188)	82231 (21528)	72867 (34967)

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

	(1) All warehouses	(2) Fulfillment Center	(3) Delivery Station
ATT	-0.0128145***	-0.0037991	-0.0188793***
	(0.0021361)	(0.0029484)	(0.0026648)
N	14,889	6,072	8,817

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	-0.0370632 ***	-0.002011	-0.0442688***
	(0.0083155)	(0.003019)	(0.0111943)
N	14,889	6,072	8,817

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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

	Log of the number of income earners under 26,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0274129***	0.0123747***	-0.0342627***
	(0.0076949)	(0.002619)	(0.0101102)
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	-0.068512***	-0.0265712***	-0.0790891***
	(0.0101167)	(0.0048411)	(0.0138038)
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	-0.120827***	-0.0868738***	-0.1273644***
	(0.0179682)	(0.0230464)	(0.0253246)
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	-0.0102294***	-0.0085253***	-0.0092191***
	(0.0012819)	(0.0016302)	(0.0015817)
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	-0.0019083***	-0.0016474	-0.0027285***
	(0.0004758)	(0.0008578)	(0.0005873)
N	14,888	6,071	8,817
	Log income over 55,000 €		
	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0148397***	-0.0068347	-0.0160657***
	(0.0043294)	(0.0102293)	(0.0047976)
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.

Figures

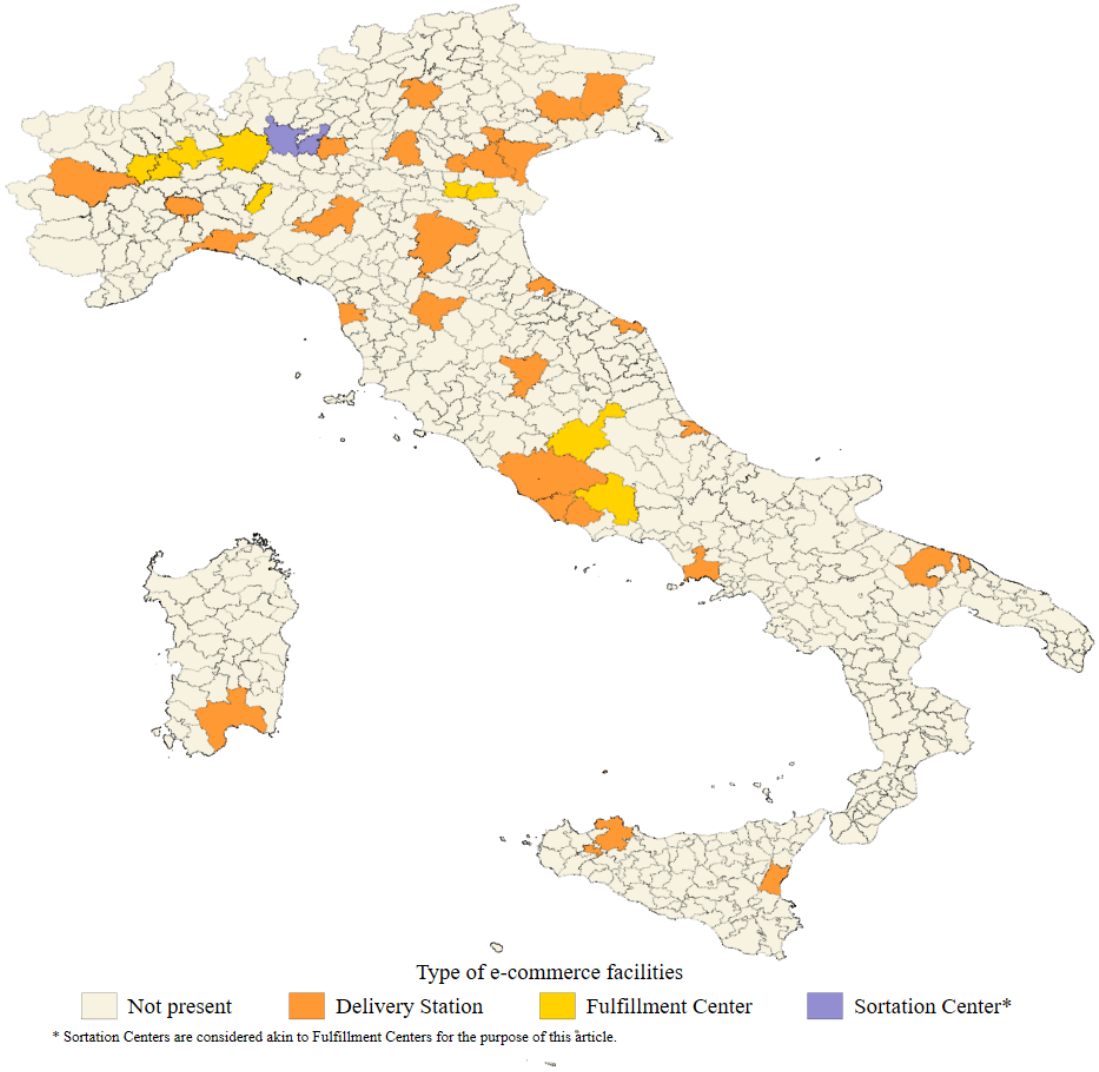

Figure 1: Type of Amazon platform facilities

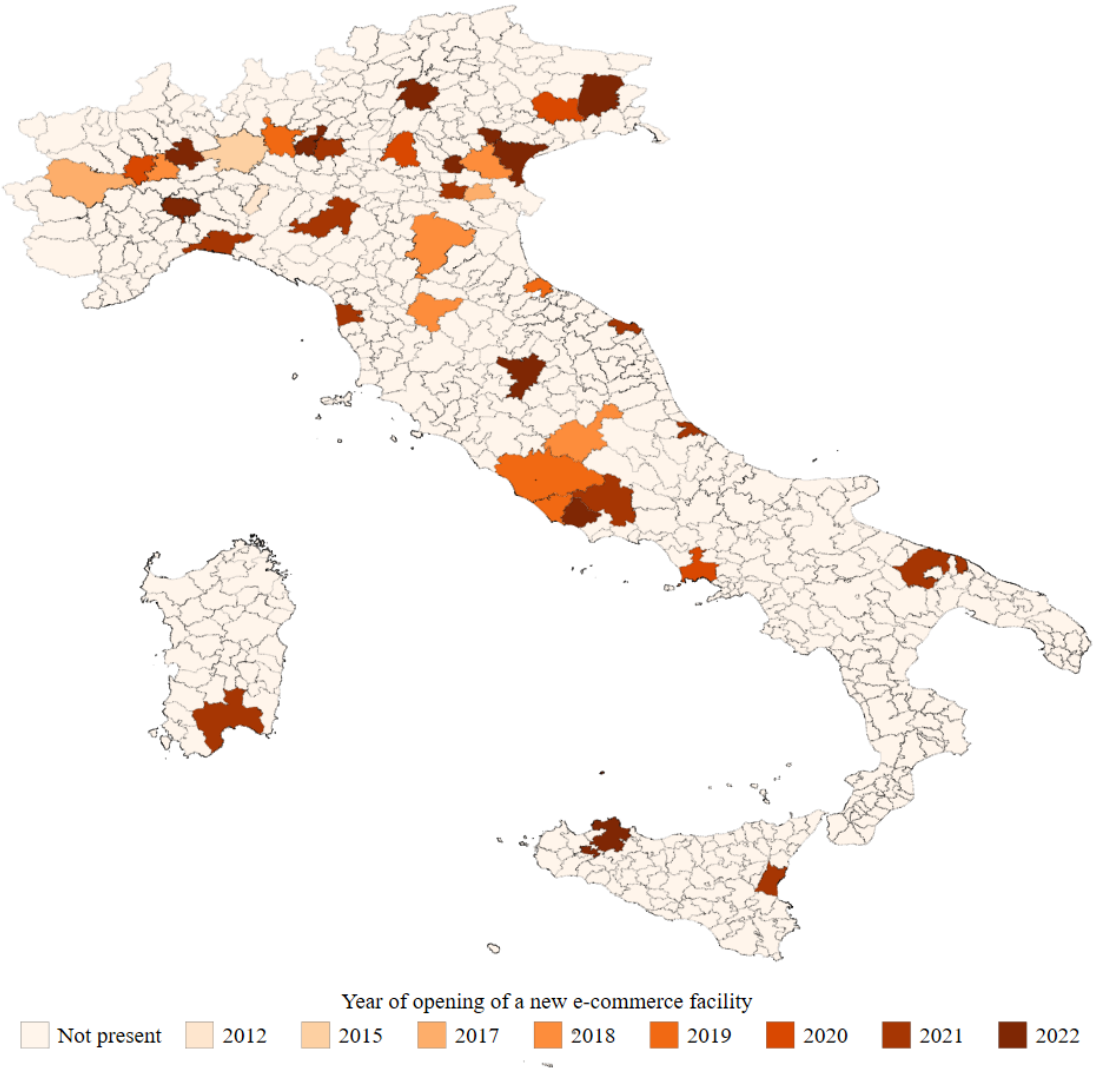

Figure 2: Development over time of Amazon platform facilities

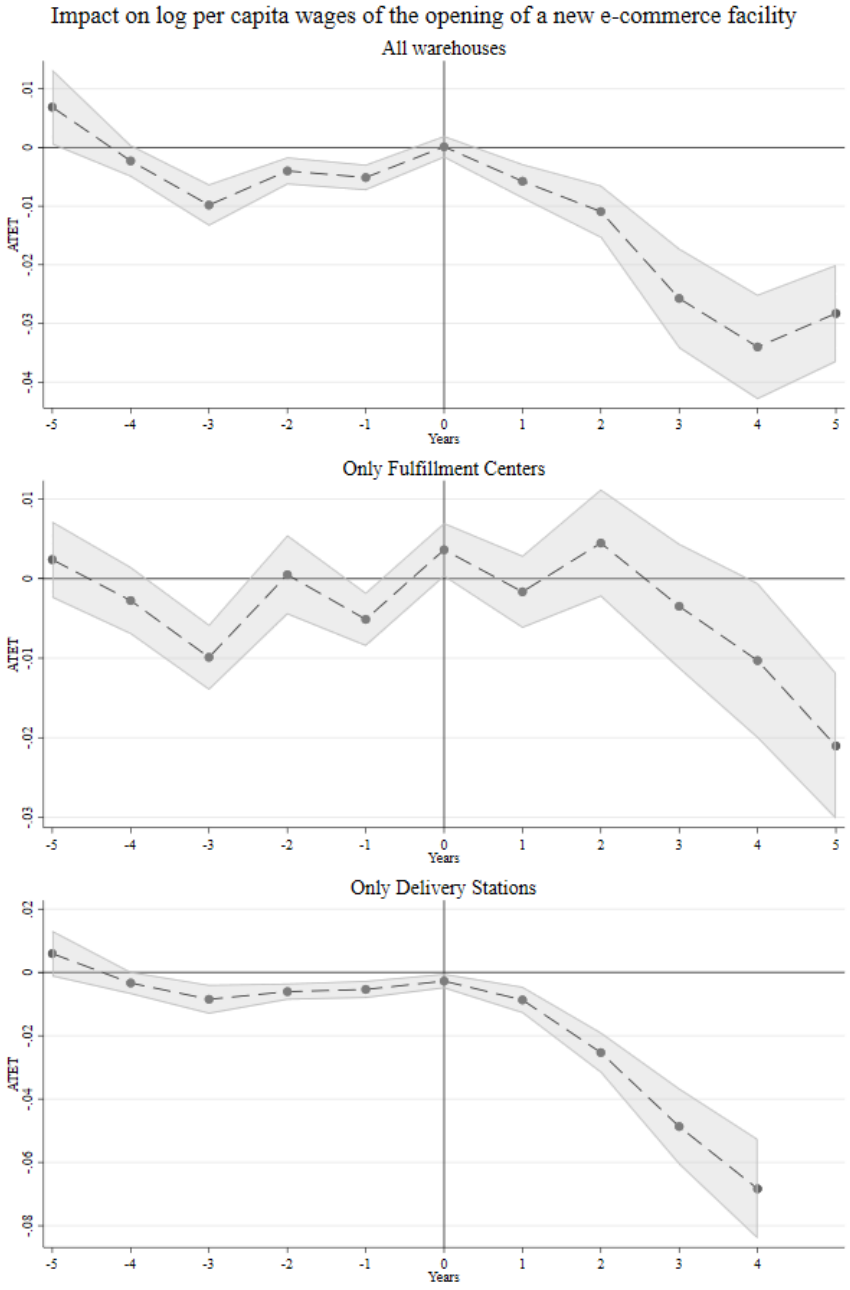

Figure 3: Impact of a new Amazon facility on wages

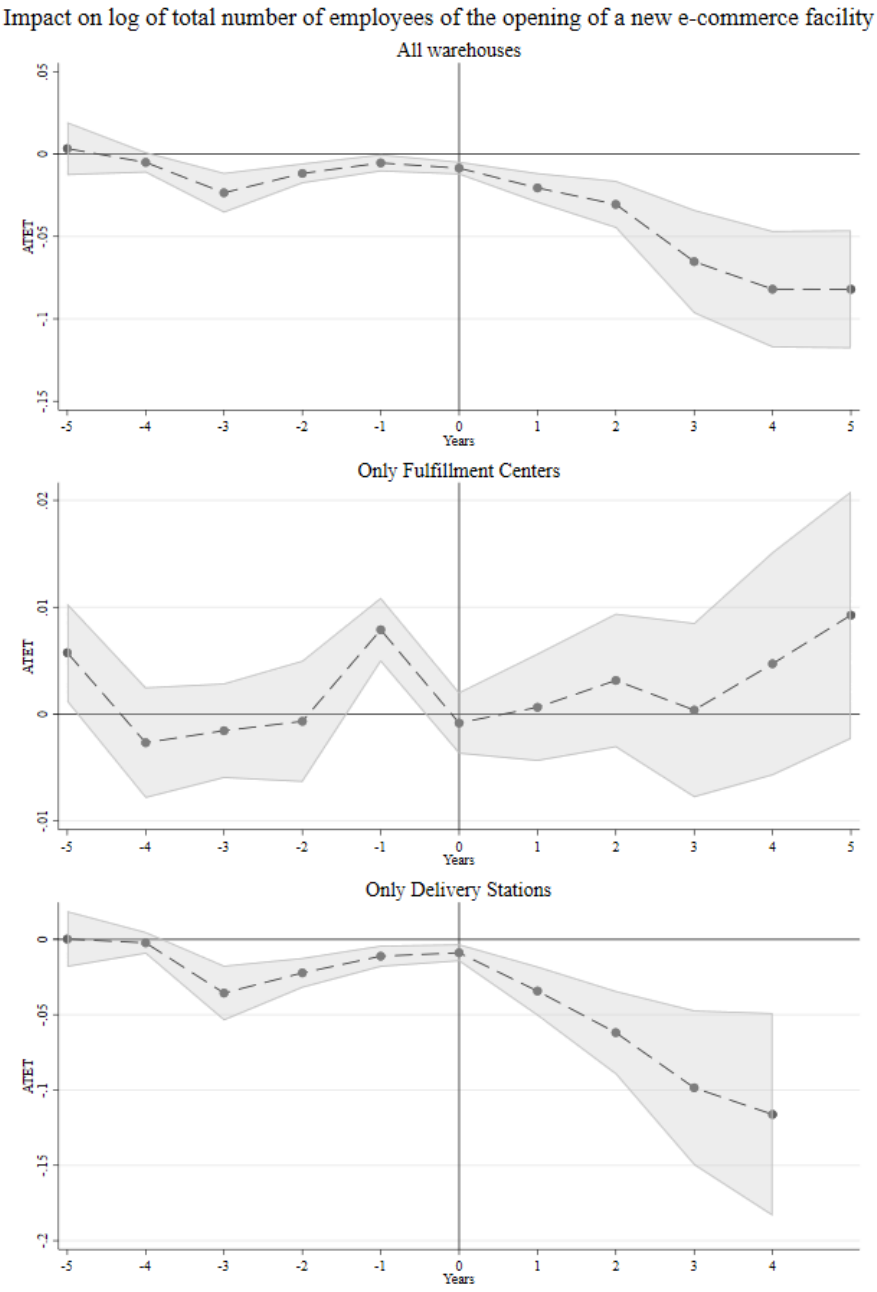

Figure 4: Impact of a new Amazon facility on number of employees

Appendix

Tables

Table A.1: Descriptive statistics for municipalities - without Milan, 2013

	Not present	Fulfillment Center	Delivery Stations	Total
Number of municipalities	6,661 (84.6%)	378 (4.8%)	832 (10.6%)	7,871 (100.0%)
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)

Table A.2: Impact of new e-commerce facilities on log wages - 50km radius treatment

	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0125085***	-0.0023207	-0.0208887***
	(0.0030732)	(0.0044001)	(0.0039891)
N	6,753	2,959	3,794

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: Impact of new e-commerce facilities on the log number of employees - 50km radius treatment

	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0409697 **	-.0057332	-0.0663695**
	(0.0134941)	(0.0041094)	(0.0220405)
N	6,753	2,959	3,794

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.4: Impact of new e-commerce facilities on log wages - Milan excluded

	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.0124654***	-0.0022091	-0.0188793***
	(0.002245)	(0.0035793)	(0.0026648)
N	12,975	4,158	8,817

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.5: Impact of new e-commerce facilities on the log number of employees - Milan excluded

	(1)	(2)	(3)
	All warehouses	Fulfillment Center	Delivery Station
ATT	-0.028383 ***	-.0001336	-0.0442688***
	(0.0077618)	(0.0034845)	(0.0111943)
N	12,975	4,158	8,817

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figures

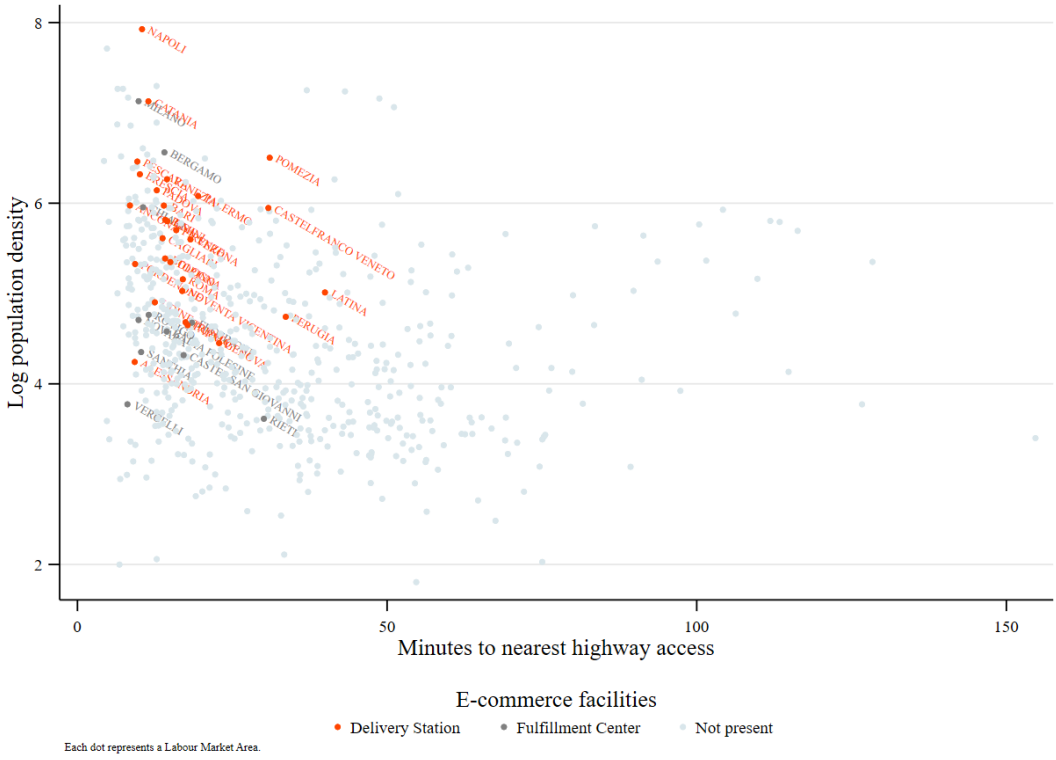

Figure A.1: Density and highway access for LMAs with e-commerce presence

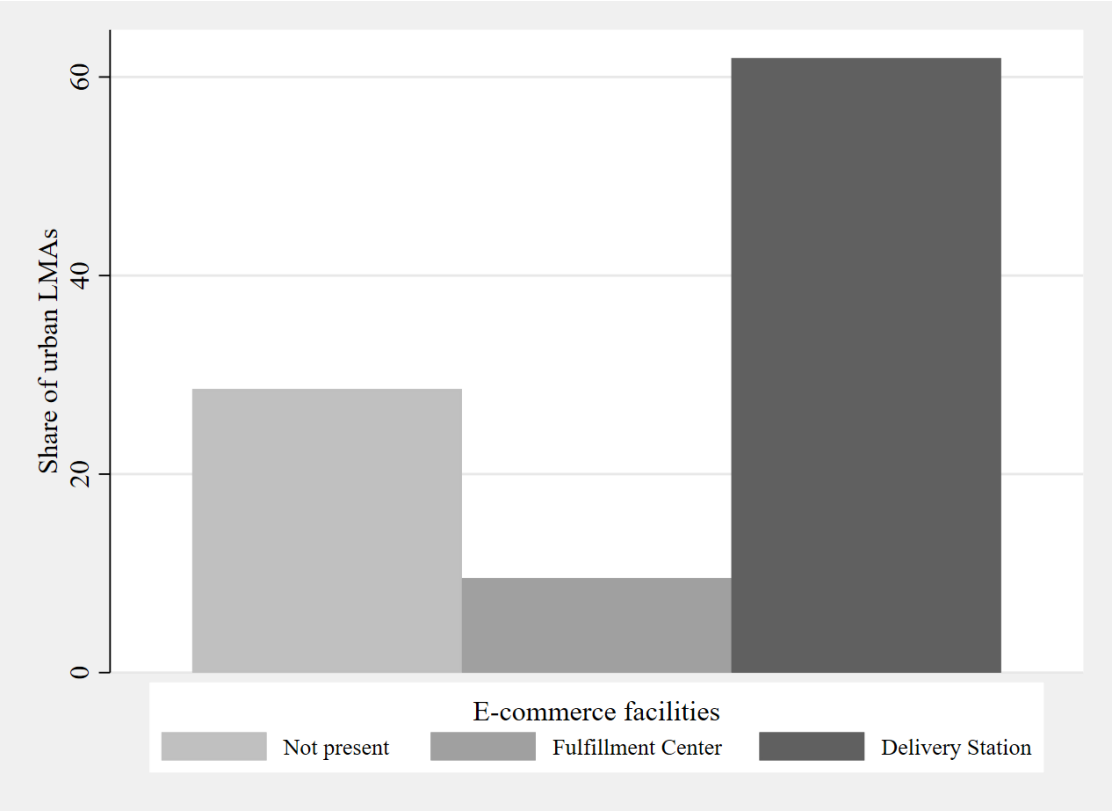

Figure A.2: Share of urban LMAs by e-commerce presence

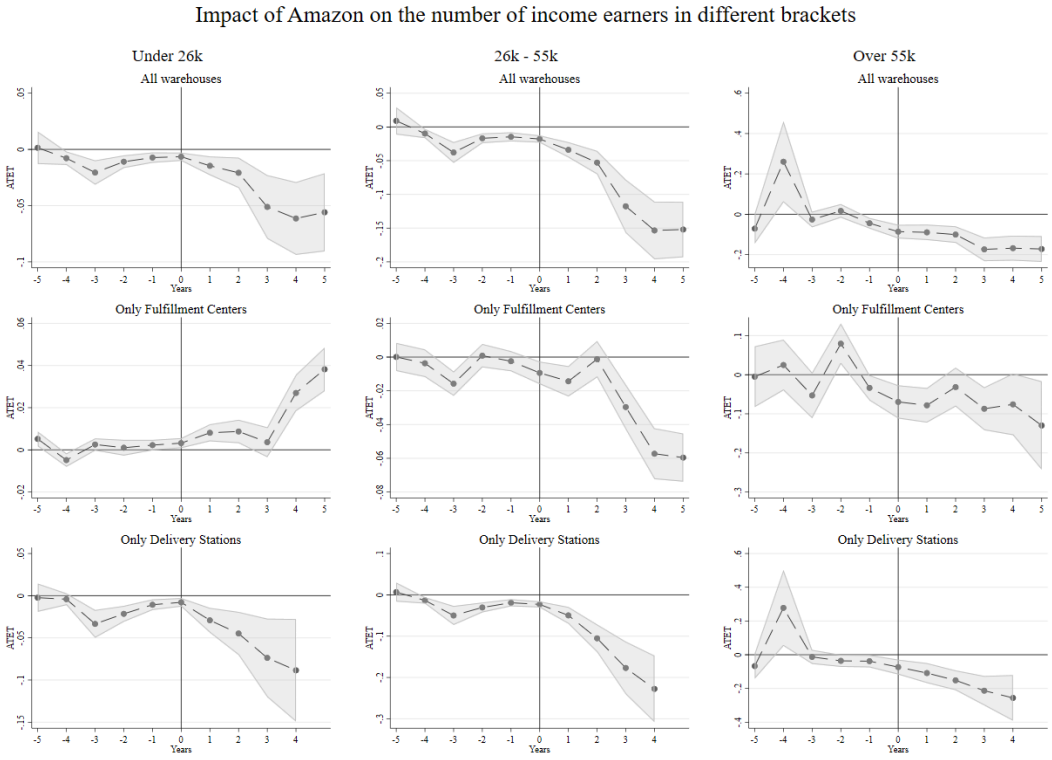

Figure A.3: Impact of new e-commerce facilities on number of earners by income brackets

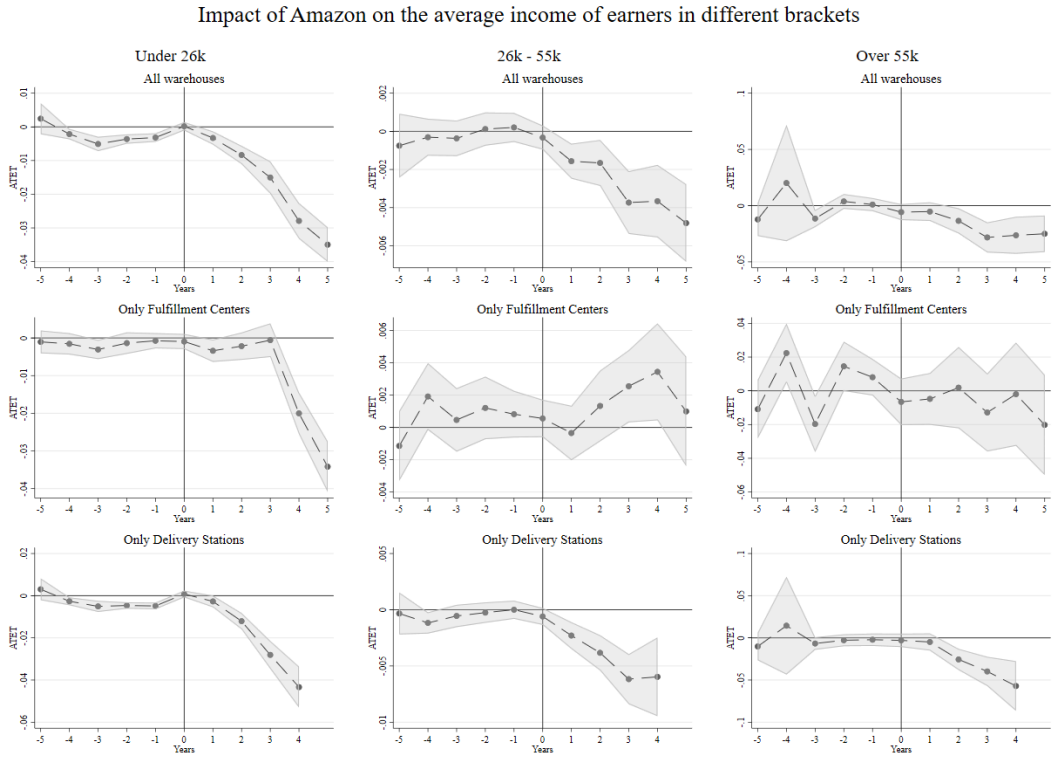

Figure A.4: Impact of new e-commerce facilities on average income by income brackets

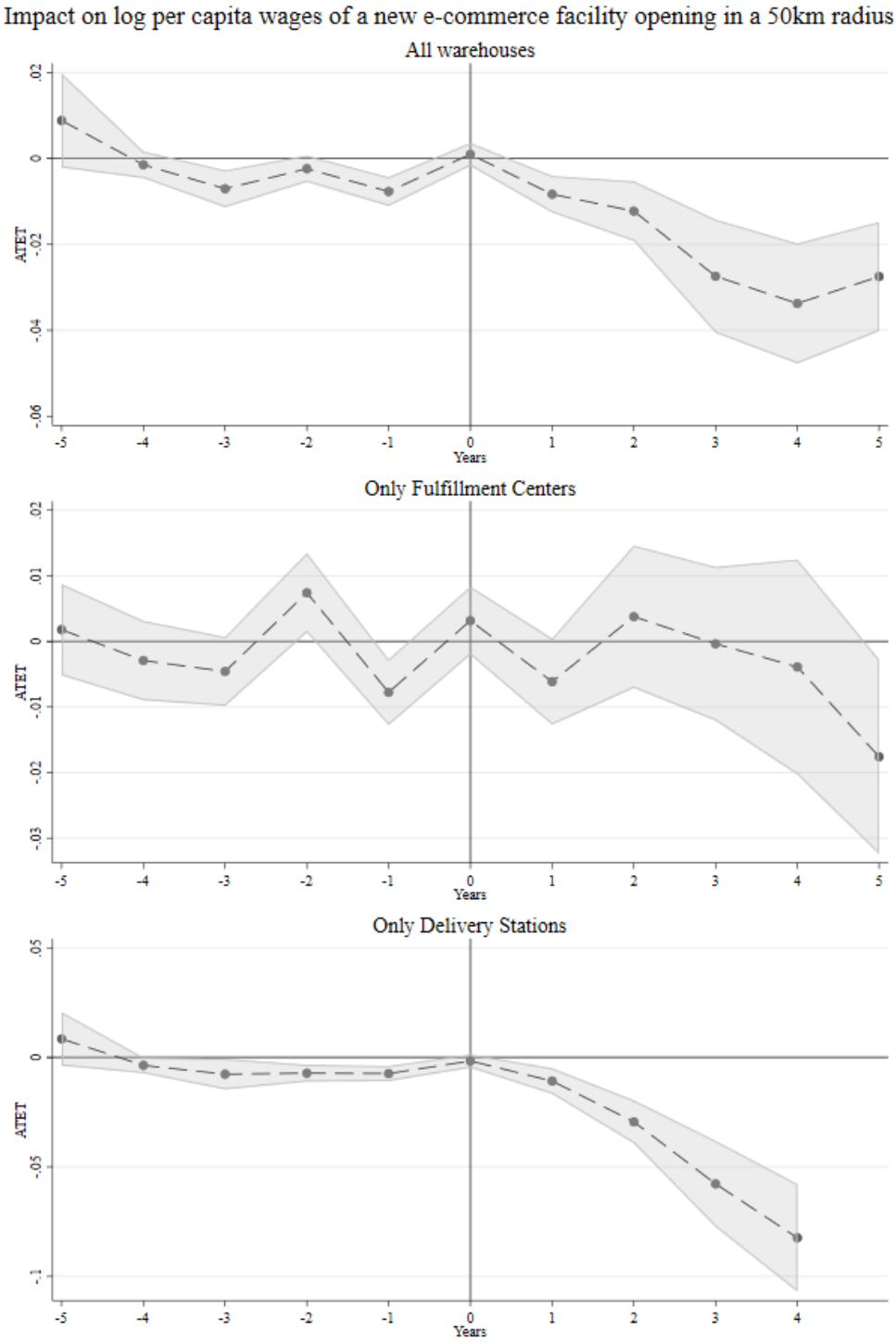

Figure A.5: Analysis of wage impact using a centroid distance measure

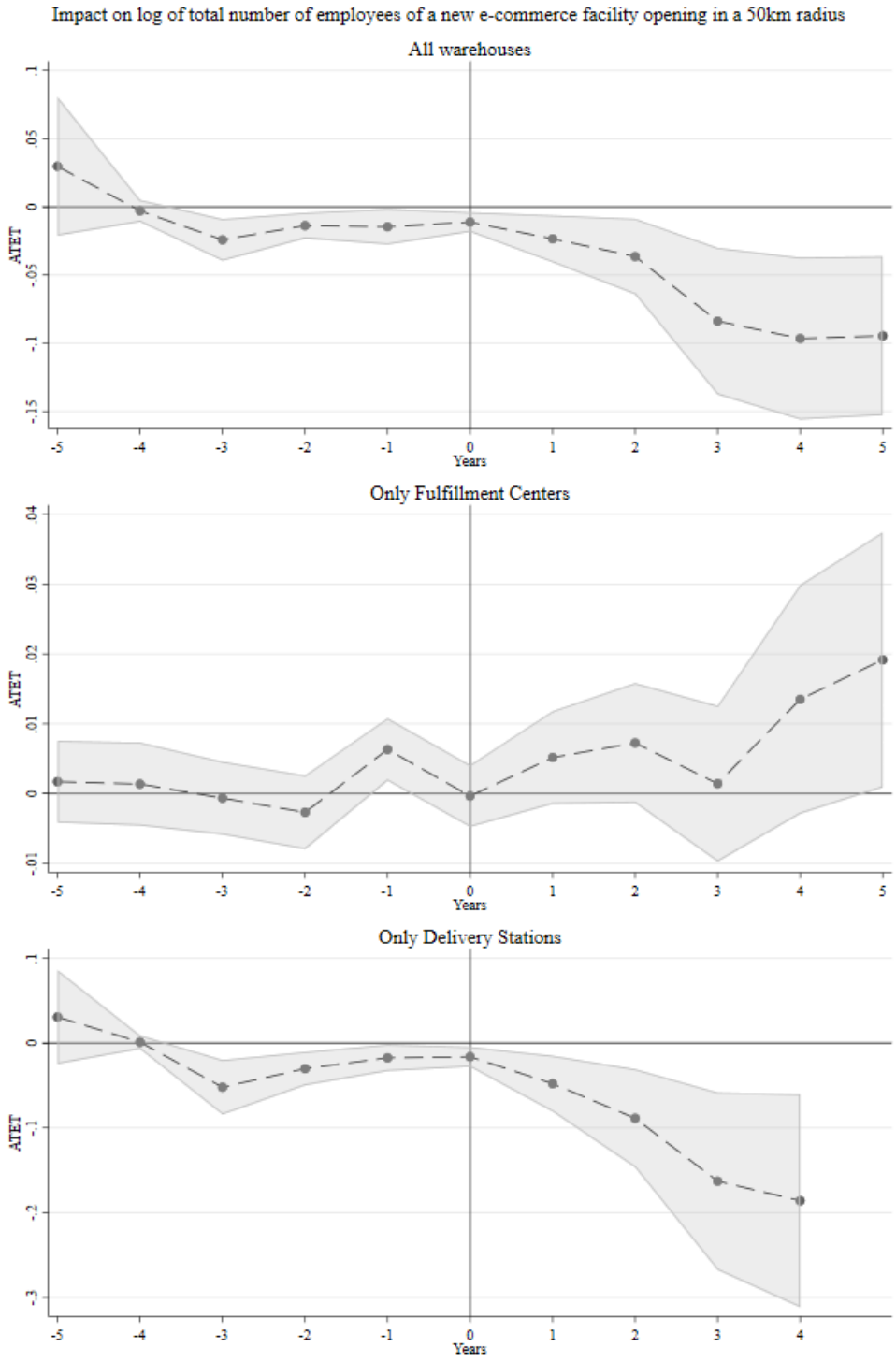

Figure A.6: Analysis of employment impact using a centroid distance measure

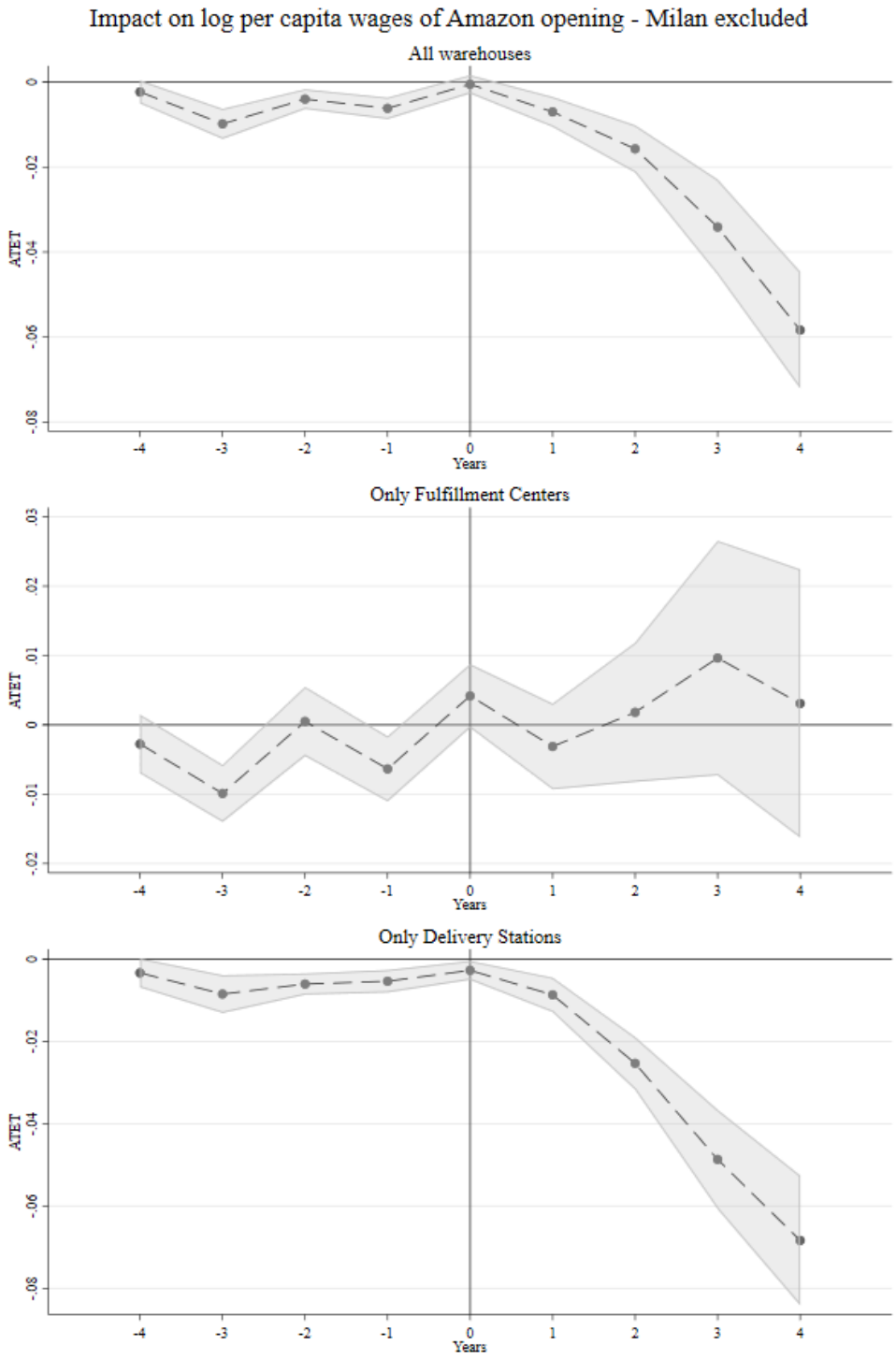

Figure A.7: Analysis of wage impact excluding the Milan Labour Market Area

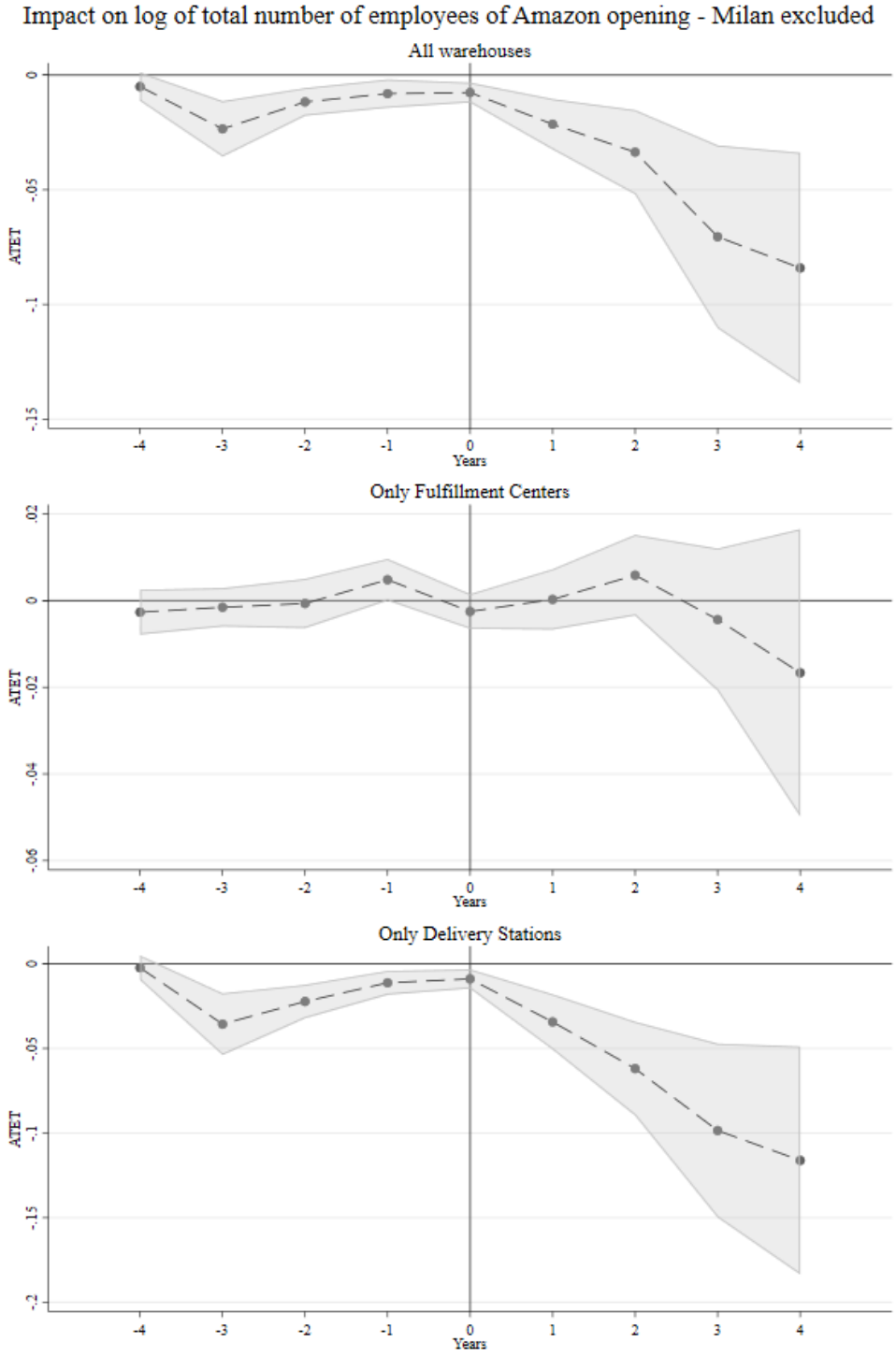

Figure A.8: Analysis of employment impact excluding the Milan Labour Market Area