In the Middle of the Urban-Rural Divide: Entrepreneurship for Growth Dynamics in Sweden's Micropolitan Regions

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Abstract

This paper examines the role of entrepreneurship in shaping growth dynamics in Sweden's micropolitan regions, municipalities located between metropolitan cores and rural peripheries. Using longitudinal data for all 290 Swedish municipalities from 2007 to 2023, we estimate dynamic panel models to assess how entrepreneurial activity, primarily measured by new firm entry and micro-firm prevalence, affects population, employment, productivity, and wage growth. Our findings reveal that micropolitan regions exhibit distinct growth patterns. Moreover, a higher share of micro firms is robustly associated with population expansion, while entry rates show limited short-run effects on structural upgrading. These results underline the importance of entrepreneurship for extensive growth margins in intermediate regions and highlight how local conditions mediate its impact, offering insights for place-based strategies aimed at inclusive regional development.

Keywords: Growth, entrepreneurship, micropolitan regions

1. Introduction

Regional growth research has for long centered on metropolitan areas, and for good reasons: large cities concentrate population, infrastructure, innovation, and institutional capacity, making them engines of national economies (Glaeser et al., 1992, Florida, 2002, Florida et al., 2018). Agglomeration economies, dense labor markets, and high levels of human capital reinforce this metropolitan advantage (Rosenthal and Strange, 2004), yet this city-centric focus has overshadowed smaller urban regions, particularly micropolitan areas[1] whose developmental paths remain underexplored despite their critical role in national spatial systems as connectors and growth anchors (Dijkstra et al., 2013). Often treated as "in-between places", micropolitan regions are neither fully urban nor rural, but are frequently aggregated with one of these categories or overlooked entirely (Vias, 2012a).

This paper addresses this gap by examining growth dynamics in Swedish micropolitan regions, with particular focus on entrepreneurship. These regions account for roughly one-third of Sweden's 290 municipalities and form a key part of the urban-rural hierarchy. More specifically, the paper asks three interrelated questions: What patterns of growth and entrepreneurship can be observed in Swedish micropolitan regions? How do these patterns diverge from those characterizing more urban or more rural contexts, and to what extent does entrepreneurship contribute to the growth of micropolitan regions? Finally, how do other place-specific factors interact with entrepreneurship to shape regional growth trajectories?

To answer these questions, we analyze changes in population, employment, wages, and labor productivity across all the 290 Swedish municipalities from 2007 to 2023. By situating micropolitan regions within Sweden's spatial structure and exploring the interaction between entrepreneurship and place-specific conditions, this study contributes to a deeper understanding of growth mechanisms in micropolitan areas.

The concept of micropolitan regions is originating in the United States, where "micropolitan statistical areas" are defined as the county or counties (or equivalent entities) anchored by an urban cluster of 10,000 to 50,000 inhabitants, plus adjacent counties with strong commuting ties. These areas have attracted policy attention and scholarly interest, with studies highlighting their demographic, economic, and industrial characteristics (see, for example, Mulligan and Vias (2006), and Davidsson and Rickman (2011)). Research also shows that micropolitan regions differ markedly from rural areas in socioeconomic structure (Brown et al., 2004), and has varied industrial compositions that shape growth and vulnerability to economic changes (Vias et al. (2002). Despite this body of work, Vias (2012b) noted over a decade ago that research on micropolitan growth remained limited, a gap that persists today.

[1] For the purpose of this paper, the terms *micropolitan areas* and *micropolitan regions* will be used interchangeably as synonyms.

Recent work emphasize their strategic role in bridging the urban-rural divide and mitigating associated economic and political tensions (Foster and Gillette (2023). Micropolitan areas often act as connectors between rural hinterlands and urban economies, facilitating broader regional integration (Roberts and Hohmann (2014). However, their growth is far from guaranteed since their mixed economic profiles and exposure to structural shifts often make them vulnerable to industrial restructuring or demographic aging (Vias, 2012b).

A more recent strand of research further highlights the diversity of factors shaping micropolitan development. Liu et al. (2021), examining entrepreneurial activity in US micropolitan regions, find positive associations between entrepreneurship, the middle-aged population share, and natural amenities, while high-tech firm startups are driven primarily by human capital and metropolitan access. McFarland and Grabowski (2022) underscore the importance of inter-regional connectivity for micropolitan growth. While studies from the U.S dominate the literature, evidence from other contexts remain scarce, with only a handful examples from Europe. Bjarnason et al. (2021) analyze micropolitan regions in Iceland and highlight their role in shaping urban–rural migration patterns. Birkner et al. (2018), drawing on survey evidence, conclude that Hungarian micropolitan regions face challenges in competitiveness and innovation linked to limited human capital.

In many countries, including Sweden, micropolitan regions have emerged around historical manufacturing hubs or regional administrative centers. Their growth trajectories have been shaped by sectoral specialization, proximity to larger cities, and the framing of regional development policies (Dijkstra et al., 2013, Roberts and Hohmann, 2014). As such, growth patterns in micropolitan regions often diverge from those in both urban cores, which benefit from agglomeration economies, and rural areas, which rely on land-based industries or tourism. Micropolitan areas tend to exhibit greater volatility and specialization in sectors such as public employment, manufacturing, or logistics (Mulligan and Vias, 2006). They therefore need to be studied in their own right rather than as scaled-down cities or enlarged rural towns, as they represent distinct entities within the broader spatial structure.

Entrepreneurship may be of particular importance in micropolitan areas as non-urban regions often offer limited employment opportunities within the traditional labor market (Duranton and Puga, 2004), which in smaller locations is typically concentrated in manufacturing industries. At the same time, such locations may present favorable opportunities for entrepreneurs to leverage local skills and place-specific amenities, for instance, in tourism-related activities (Naldi et al., 2015). Entrepreneurship can thus be both necessity- and opportunity driven (Amit and Muller, 1995). In this paper, we measure entrepreneurship in terms of both self-employment, new firm formation, and presence of micro firms, with particular attention to knowledge-intensive firms, which play a significant role in knowledge spillovers and regional economic development (Stam and Wennberg, 2009).

Innovation and entrepreneurship have been identified as key drivers of growth in intermediate and rural regions, though the underlying pathways often differ from those observed in metropolitan settings. North and Smallbone (2000) show that the most innovative SMEs in smaller regions tend to

be the most dynamic in terms of growth and job creation. Innovation in these contexts is frequently incremental, encompassing modifications to products, processes, marketing, and market expansion, and firms in smaller regions can match or even exceed the innovative performance of urban firms when compared within similar sectors. Keeble and Tyler (1995) and North and Smallbone (2000) find that firms in more accessible smaller regions benefit from stronger knowledge networks and institutional supports, while even remote firms may succeed by adapting to local constraints and serving niche markets. Innovation in such settings often reflects resource scarcity and localized demand structures, prompting firms to develop creative, context-specific solutions. Vaessen and Keeble (1995) similarly argue that firms in peripheral regions can overcome locational disadvantages through niche specialization and strategies emphasizing innovation, training, and workforce development.

To analyze the relationship between entrepreneurship and subsequent regional growth, we use a dynamic panel framework with fixed effects and robustness checks using System GMM to estimate the impact of entrepreneurship on growth. Our findings show that in micropolitan regions, a higher share of micro firms is robustly associated with population growth, suggesting that small-scale entrepreneurship primarily supports demographic expansion rather than structural upgrading. Entry rates show limited short-run effects on productivity or wages, indicating that start-up dynamism does not immediately translate into quality-driven growth. Urban regions display an opposite pattern. There, micro-firm prevalence correlates negatively with population, employment, and wage growth, while human capital and manufacturing specialization dominate as drivers of wage and productivity upgrading. Rural regions resemble micropolitan areas in their reliance on micro firms for extensive growth margins but differ in that entry rates positively affect employment growth and tourism intensity plays a stronger role in shaping demographic and labor-market outcomes. Knowledge-intensive entrepreneurship is strongly related to higher levels of human capital in general.

By focusing on Swedish micropolitan regions, this paper contributes in three ways. First, it extends and strengthens the micropolitan research agenda beyond the U.S., offering insights from a European context characterized by different institutional and spatial dynamics. Second, it emphasizes entrepreneurship as a key mechanism shaping growth patterns in these intermediate regions, where traditional labor markets often provide limited opportunities. Third, it explores how local conditions – such as the degree of remoteness, human capital, and sectoral specialization – moderate these effects, which we hope will nuance existing patterns and inform both theory and policy. Understanding these dynamics is critical for designing place-based strategies that foster inclusive growth and strengthen the resilience of regions situated between urban cores and rural peripheries.

The rest of the paper is organized as follows. Section 2 outlines the empirical strategy, including descriptions of data, variables, and estimation techniques. Section 3 presents descriptive statistics, showing the development of growth and entrepreneurship over time. Section 4 focuses on the results of the regression analysis, while section 5 concludes the paper.

2. Empirical strategy

2.1 Data and variables

To answer the research questions, we use publicly available data on municipality level from Statistics Sweden (SCB), combined with aggregated full population geo-coded microdata from SCB. In total, there are 290 municipalities. The data is longitudinal, and we use observations from 2007 to 2023[2].

Variables on *regional growth* are constructed using publicly available annual municipal data. We calculate the change in (nighttime) population, employment (daytime population), labor productivity (GRP, in 2020 prices, per employed person), and average wages (wage sum, in 2020 prices, per employed person)[3]. While population growth captures the overall attractiveness of a region, employment growth reflects labor-market expansion and the capacity of local economies to create jobs. Productivity growth captures efficiency gains and structural upgrading within the regional economy. Finally, average wage growth reflects changes in labor income and job quality. Together, these measures provide a balanced view of both the quantitative and qualitative dimensions of regional development.

Variables related to entrepreneurship are derived from annual microdata. We count the number of new firms[4] in each municipality and year and calculate the entry rate as the ratio of new firms to the working-age population (ages 20-64). We measure the share of self-employed individuals within the day-time working-age population[5] in each municipality and year. Finally, we calculate the annual share of micro (fewer than ten employees[6]) single-establishment[7] firms out of all firms in each municipality. Following Eurostat's definitions, we further classify new firms, self-employed, and micro firms as engaging in knowledge-intensive activities (KIA) or not, based on their industry affiliation (see Appendix A), and compute the share of KIA entities within the respective population.

The control variables are mainly calculated using publicly available annual municipal data. We measure the share of highly educated individuals (those with at least three years of higher education) in the 25-64 age group (day population), and the share of younger (age 15-29) and older (age 65+) individuals as demographic controls. The share of highly educated is expected to be particularly important in the average wage estimation (Mincer, 1974) as well as for productivity growth (Mincer, 1984, Mankiw et al., 1992, Romer, 1990, Romer, 1989). We control for industry structure using location

[2] We start in 2007 as the SNI classification changed from this year, creating a structural break. 2023 is the last year of micro data availability.
[3] Additionally, we have calculated growth in GRP and wage sums. Due to strong correlation with productivity and employment growth, respectively, we do not include these variables in the analysis.
[4] We do not consider firms created through divisions of existing firms, nor firms created by mergers, as new firms.
[5] Day population includes individuals working in the respective municipality, no matter where they live, and that are classified as employed by Statistics Sweden.
[6] https://single-market-economy.ec.europa.eu/smes/sme-fundamentals/sme-definition_en
[7] In the data, all firms are classified as either single or multiple establishment firms.

quotients (LQ) for mining and quarrying, manufacturing, and accommodation and food service activities, which serve as proxies for the intensity of mining, manufacturing and tourism, respectively.

Furthermore, we include the employment rate to capture overall municipal labor market functioning, which is expected to be particularly important when estimating employment and average wage outcomes. In addition, using firm- and establishment-level microdata, we construct an annual measure of capital intensity at the municipal level. First, regional physical capital is obtained by aggregating tangible fixed assets from the establishment level to the municipal level. Second, this measure of regional physical capital is divided by total employment to derive the capital intensity indicator. Following traditional growth models, we expect capital intensity to be particularly correlated with productivity (Solow, 1956). Finally, we calculate population density as the number of people (night population) per square kilometer, serving as a catch-all variable for agglomeration economies (Duranton and Puga, 2004). Capital intensity and population density enter the regression models in logarithmic form.

2.2 Identifying micropolitan regions

To identify micropolitan regions in the Swedish context, we begin at the municipality level, which is the smallest administrative unit in Sweden. Municipalities that have a delineated urban area (*tätort* in Swedish) with 10,000 to 50,000 inhabitants are classified as micropolitan. Based on this definition, 97 out of 290 municipalities are categorized as micropolitan. 38 municipalities are larger than micropolitan, hereafter denoted as 'urban'[8], while 155 municipalities are smaller, hereafter denoted as 'rural'. The municipalities can be further classified as being remotely located or not, where non-remote municipalities have less than a 45-minute drive to an urban area with at least 50,000 inhabitants (Tillväxtverket, 2025). All urban municipalities are thus per definition non-remote. Of the 97 micropolitan municipalities, 26 are remote and 71 are non-remote, hereafter denoted as 'close'. Of the 155 rural municipalities, 84 can be classified as close while 71 are remote.

Figure 1 illustrates the geographic distribution of Swedish municipalities by type, urban, micropolitan and rural, and highlights the spatial spread of micropolitan regions across the country. Notably, these regions are concentrated outside the metropolitan cores but remain well distributed across southern and central Sweden, with remote micropolitan areas primarily located in the northern inland. This spatial pattern underscores their role as connectors between urban and rural economies and the diversity of contexts in which they operate.

[8] This also includes municipalities that have a delineated urban area (*tätort*) of 10,000-50,000 inhabitants but that are pre-classified as metropolitan (Tillväxtanalys, 2025). This concerns Lomma and Staffanstorp, which are part of Malmö metropolitan area, and Botkyrka, Lidingö, Salem, Sigtuna, and Upplands-Bro, which are part of Stockholm metropolitan area. Additionally, some municipalities' urban areas are not delineated but are part of a metropolitan urban area, such as Burlöv, whose central city Arlöv is part of Malmö's urban area, Mölndal and Partille are part of Gothenburg's urban area, and Danderyd, Haninge, Huddinge, Järfälla. Nacka, Solna, Sundbyberg, and Tyresö are all part of Stockholm's urban area.

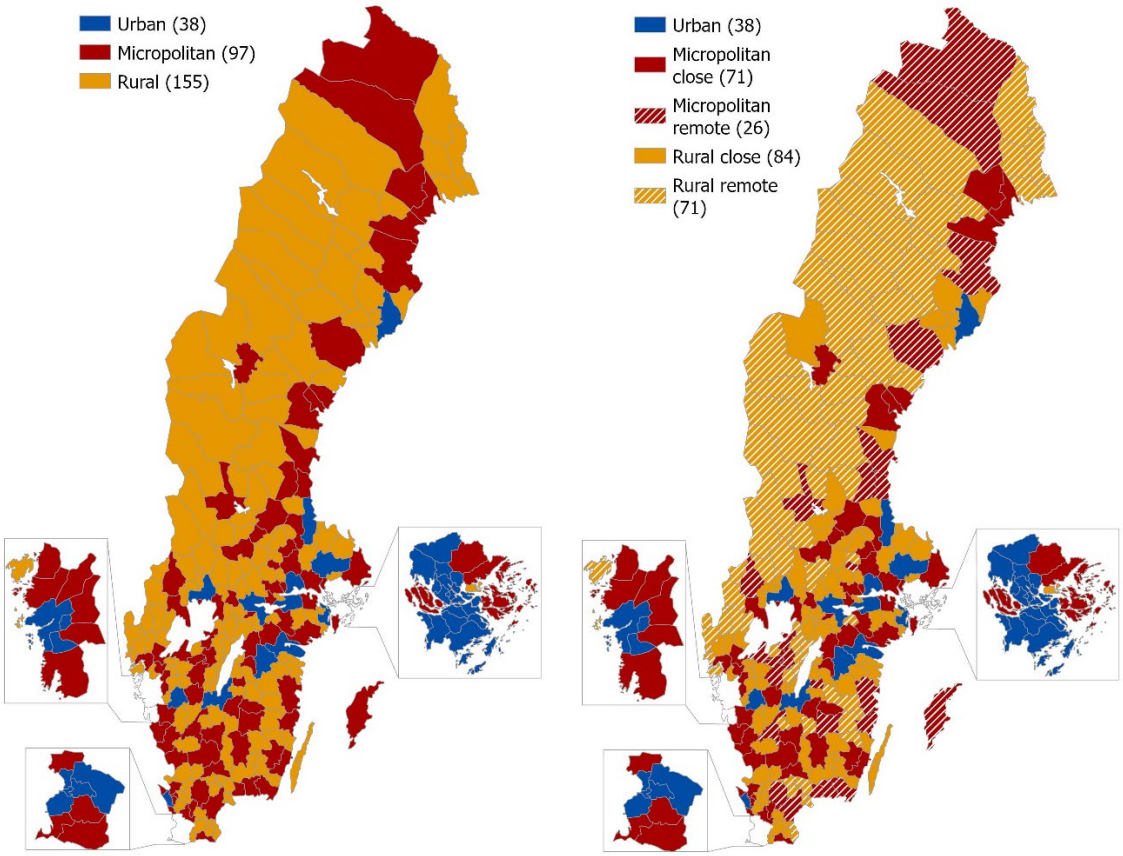

Figure 1. Geographic location of (various types of) micropolitan regions.

2.3 Model and estimations

We estimate the association between entrepreneurship and subsequent growth at municipality level using the dynamic fixed effects panel model in Equation 1:

$$\Delta \ln Y_{m,t,t-i} = \alpha_m + \mu_t + \boldsymbol{\beta}' \boldsymbol{ENT}_{m,t-i} + \boldsymbol{\gamma}' \boldsymbol{X}_{m,t} + \varphi \ln Y_{m,t-i} + \varepsilon_{m,t} \qquad (1)$$

Here, $\Delta Y_{m,t,t-i}$ denotes the growth in population, employment, productivity, or average wage for municipality *m* over the period *t-i* to *t*, defined as $\ln Y_{m,t} - \ln Y_{m,t-i}$. To capture both short- and medium-term dynamics, we estimate the model using *i=1* (annual growth), *i=3* (three-year growth), and *i=5* (five-year growth). $ENT_{m,t-i}$ is a vector of entrepreneurship indicators, and $X_{m,t}$ contains control variables. Year fixed effects μ_t absorb common aggregate shocks (such as the financial crisis and the COVID-19 pandemic), while α_m represent municipality-specific effects. The lagged dependent variable Y_{t-i} accounts for persistence in local economic conditions, and $\varepsilon_{m,t}$ is the idiosyncratic error term.

Including a lagged dependent variable in a fixed-effects panel model (FE–LDV) induces the small-sample bias described by Nickell (1981). However, this bias diminishes rapidly with the length

of the time dimension. With $T = 14$, the remaining bias is expected to be modest, as shown in simulation studies by Judson and Owen (1999) and Bruno (2005). Importantly, the bias primarily affects the dynamic parameter φ and has little impact on the coefficients of predetermined regressors, including the entrepreneurship measures that are our main parameters of interest. We treat the entrepreneurship indicators as predetermined as they may respond to past economic conditions but are assumed not to respond contemporaneously to shocks affecting growth in year t. Under this timing assumption, and given the length of our panel, the FE–LDV estimator provides a straightforward and transparent approach for identifying the effect of lagged entrepreneurship on subsequent growth.

Another issue in the multi-year growth models is that the growth windows overlap, which implies that the residuals follow Moving Average processes of order one and four (MA(1) and MA(4), respectively). Consequently, the error term in one period is correlated with that of the preceding period. To account for this serial correlation and potential heteroscedasticity, all models are estimated using robust standard errors clustered at the municipality level.

To examine heterogeneity across different types of municipalities, we split the sample and run separate regressions for urban, micropolitan, and rural municipalities, respectively. To examine how (if) other place-specific factors interact with entrepreneurship in micropolitan growth patterns, interaction terms between entrepreneurship and, for example, remoteness, share of highly educated, and LQ tourism are introduced. Additionally, for comparisons with purely correlational estimates, we continuously perform pooled OLS estimation where α_m is replaced by α in Equation 1 and where we also include dummies for municipality type.

As a robustness check, we complement the FE–LDV estimates with dynamic panel System GMM models estimated using xtabond2 (Roodman, 2009a). These specifications relax the assumption that entrepreneurship is not affected by present (year *t*) shocks and account for the potential remaining Nickell bias. Hence, we treat both the lagged dependent variable and the entrepreneurship indicators as endogenous and are instrument them using deeper lags of their own levels and differences following the approach of Arellano and Bond (1991) and Blundell and Bond (1998). The estimation is based on the two-step heteroskedasticity-robust estimator with Windmeijer's (2005) finite-sample correction. To evaluate model adequacy, we report the Arellano–Bond tests for serial correlation (AR(2)) and the Hansen test of overidentifying restrictions to assess instrument validity. As we find that these estimations are relatively sensitive to model specification, for example, the specific IV set used, as well as lag depth and lag length, System GMM are used for robustness tests rather than baseline estimations.

3. Descriptive statistics

3.1 Regional growth

Figure 2 shows the growth trajectories for urban, micropolitan, and rural regions from 2007 to 2023. Urban regions show the strongest and most consistent growth across all indicators, reflecting the patterns developed through agglomeration economies. Micropolitan regions occupy an intermediate position in the graphs, which means that their population and employment growth outpace the rural areas but remain below urban levels. Productivity shows greater volatility, but primarily for urban and rural areas, whereas micropolitan regions are steadier. These patterns emphasize the distinctiveness of micropolitan regions, meaning they are neither scaled-down cities nor a larger version of rural towns. They rather exhibit unique patterns, also highlighting the interest and importance of studying them further. In contrast, wage growth difference across types of regions is relatively modest, potentially suggesting that wage dynamics are less influenced by spatial hierarchy than our other growth dimensions of interest.

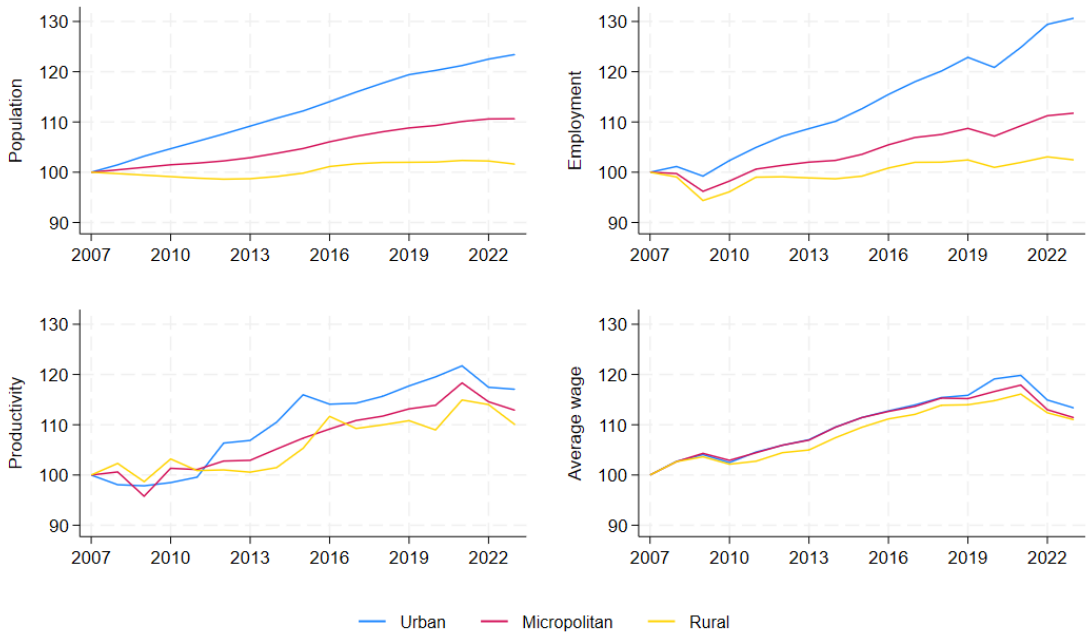

Figure 2. Change in outcome variables (indexed 2007=100) by municipality type, 2007-2023.

In a similar way, Figure 3 shows the growth indicators but distinguishes between close and remote non-urban regions, revealing how proximity to large urban centers shape growth patterns. Micropolitan regions located closer to metropolitan areas generally experience stronger population and employment growth, while remote micropolitan regions show slower demographic growth, and particularly show a more volatile productivity trend. Rural regions exhibit an even sharper divide, where close rural areas tend to be like remote micropolitan areas, with positive but slow growth. On the other

hand, remote rural areas face persistent stagnation over our period. The descriptive picture of these regions seem to highlight the importance of accessibility and connectivity in shaping these regional development outcomes.

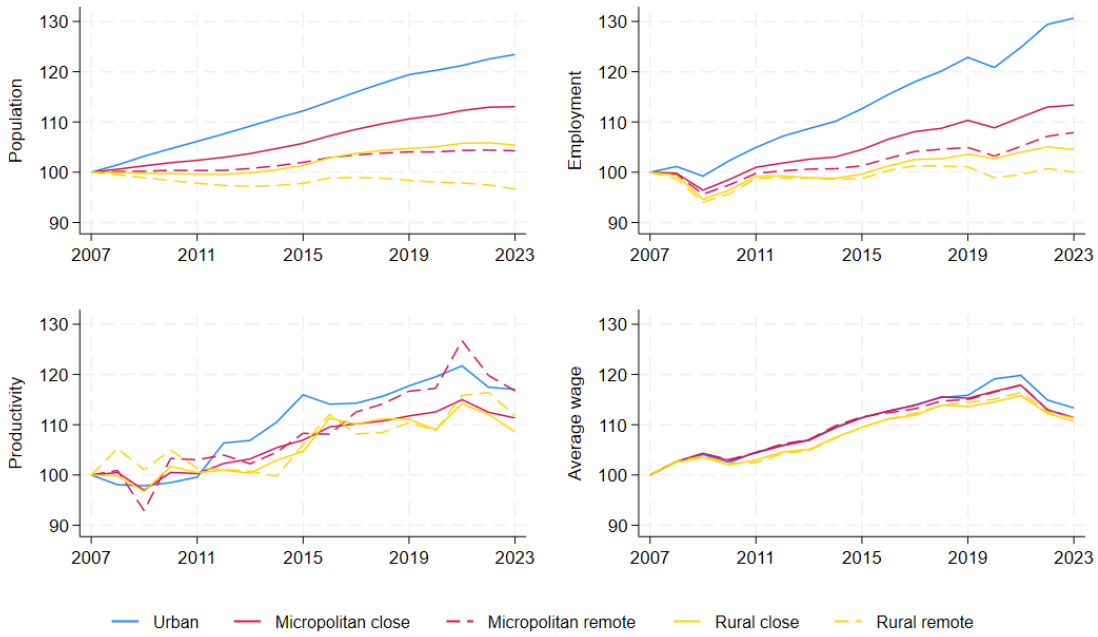

Figure 3. Change in outcome variables by municipality type, including close (solid lines) and remote (dashed lines) of non-urban municipalities, 2007-2023.

Table 1 shows the correlations among the four growth indicators, population, employment, productivity, and average wage (correlations concerning three- and five-year growth rates are shown in Appendix B. Population and employment growth are positively correlated, as expected, reflecting the connection between demographic development and labor market dynamics and expansion. However, their relationship with productivity growth is weak, indicating that growth (quantities) does not necessarily translate into sectoral efficiency gains. Interestingly, employment growth is negatively correlated with wage growth, which could have various explanations. One could be that regions that are experiencing rapid job creation also may face a downward pressure on average wages, possibly due to labor supply effects. These patterns point to a trade-off between extensive and intensive margins of growth; a theme further explored in the empirical analysis.

Table 1. Correlations between outcome variables, one-year growth 2007(8)-2023.

Obs. = 4,640	Population	Employment	Productivity	Average Wage
Population	1.0000			
Employment	0.2910	1.0000		
Productivity	0.0616	0.0331	1.0000	
Average Wage	0.1309	-0.1891	0.1073	1.0000

Notes: Observations refer to year-municipality.

Table 2 summarizes average levels of population, employment, productivity, and wages across urban, micropolitan, and rural municipalities. As expected, urban regions dominate in absolute size, with population and employment levels several times higher than those in micropolitan and rural areas. Productivity and wages also follow this geographical hierarchy, though the gaps are narrower than for population and employment, indicating that smaller regions can achieve relatively competitive income and efficiency levels, despite their scale. Micropolitan regions occupy an intermediate position, reinforcing their role as a bridge between metropolitan cores and rural peripheries.

Table 2. Descriptive statistics on outcome variables in levels averaged over 2007-2022 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
Urban					
Population	608	123,426	159,826	15,065	984,748
Employment	608	67,193	111,998	2,718	747,517
Productivity	608	943,911	192,181	600,394	1,908,897
Average wage	608	353,523	42,704	254,835	544,634
Micropolitan					
Population	1,552	36,416	18,981	11,126	105,148
Employment	1,552	15,847	10,136	4,048	54,076
Productivity	1,552	825,489	186,526	381,968	2,729,187
Average wage	1,552	318,214	28,651	245,407	446,797
Rural					
Population	2,480	10,461	4,436	2,372	26,575
Employment	2,480	4,103	1,919	729	10,672
Productivity	2,480	770,737	210,740	343,948	3,194,729
Average wage	2,480	289,273	26,403	211,779	404,776

Notes: Productivity and average wages are measured in real 2020 terms, adjusted for inflation using the national CPIF. As the outcome variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

Table 3 adds a spatial dimension by (as in Figure 3) distinguishing between close and remote non-urban regions. Among micropolitan municipalities, remote areas seem to have slightly higher employment levels, but also greater variability in productivity, suggesting there could be sensitivity to sector-specific shocks. Rural regions show a sharper divide as close rural areas have higher productivity and employment averages than remote ones, once again appearing to reflect the benefits of proximity to urban centers. Wage differences across our remoteness categories are modest, indicating that accessibility primarily is associated with demographic and employment dynamics rather than income levels.

Table 3. Descriptive statistics on outcome variables in levels averaged over 2007-2022 per close and remote micropolitan and rural regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
Micropolitan close					
Population	1,136	36,513	19,345	11,126	105,148
Employment	1,136	15,383	10,497	4,048	54,076
Productivity	1,136	816,045	139,163	567,872	1,901,349
Average wage	1,136	317,477	28,928	245,407	446,797
Micropolitan remote					
Population	416	36,152	17,971	12,183	86,738
Employment	416	17,115	8,966	6,267	42,336
Productivity	416	851,277	275,959	381,968	2,729,187
Average wage	416	320,229	27,817	259,612	414,721
Rural close					
Population	1,344	11,124	4,334	2,372	26,575
Employment	1,344	4,138	1,883	729	10,672
Productivity	1,344	762,544	177,350	486,714	3,191,044
Average wage	1,344	290,327	27,972	211,779	404,776
Rural remote					
Population	1,136	9,677	4,430	2,413	20,679
Employment	1,136	4060	1961	1030	8,828
Productivity	1,136	780,429	244,152	343,948	3,194,729
Average wage	1,136	288,026	24,371	218,102	382,631

Notes: Productivity and average wages are measured in real 2020 terms, adjusted for inflation using the national CPIF. As the outcome variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

3.2 Entrepreneurship

Table 4 reports correlations among entrepreneurship indicators; Entry rate, self-employment, and micro firms. We also consider knowledge-intensive entrepreneurship (KIA) since it is often linked to innovation and productivity growth in literature. It should be noted that there is a methodological change in the data collection by Statistics Sweden, leading to a more generous definition of being self-employed. It is therefore difficult to trace out the "true" change in self-employment between 2021 and 2022. Entry rate, self-employment, and micro firms are strongly correlated, indicating they capture overlapping aspects of entrepreneurial structure. Keeping in mind that there is a structural change in the self-employment data, and the fact that there is a strong correlation between self-employment share and share of micro firms in the region, we consider the share of micro firms can be viewed as a proxy for self-employment.

In contrast, knowledge-intensive measures (KIA) show high correlations among each other but weak associations with overall entrepreneurship indicators. This suggests that KIA reflects a different dimension, which may be interpreted as quality rather than quantity of entrepreneurship.

Table 4. Correlation between entrepreneurship variables 2007-2022.

Obs. = 4,640	Entry rate	Selfemp.	Micro firms	New KIA firms	KIA selfemp.	Micro KIA firms
Entry rate	1.0000					
Selfemployment	0.5126	1.0000				
Micro firms	0.4053	0.8154	1.0000			
New KIA firms	-0.2507	-0.1017	-0.0354	1.0000		
KIA selfemployment	-0.1407	-0.1285	-0.0663	0.9080	1.0000	
Micro KIA firms	-0.1831	-0.1300	-0.0848	0.9285	0.9838	1.0000

Notes: As the entrepreneurship variables are lagged one year in the empirical estimations, 2023 is not included in the correlations. Observations refer to year-municipality.

Figures 4 and 5 illustrate the development of entrepreneurship across urban, micropolitan, and rural regions, focusing on two core entrepreneurship indicators: entry rate and share of micro firms. These measures capture the structural and dynamic aspects of entrepreneurial activity most relevant to our research questions. Entry rates fluctuate considerably over time, with rural regions generally showing the highest peaks, suggesting a stronger reliance on new firm formation in less urbanized areas. Micropolitan regions occupy an intermediate position, while urban regions tend to have lower entry rates, reflecting more stable and mature business environments. The share of micro firms follows a clear spatial pattern. Rural regions exhibit the highest shares, micropolitan regions fall in between, and urban regions have the lowest, underscoring structural differences in firm size across the urban–rural continuum.

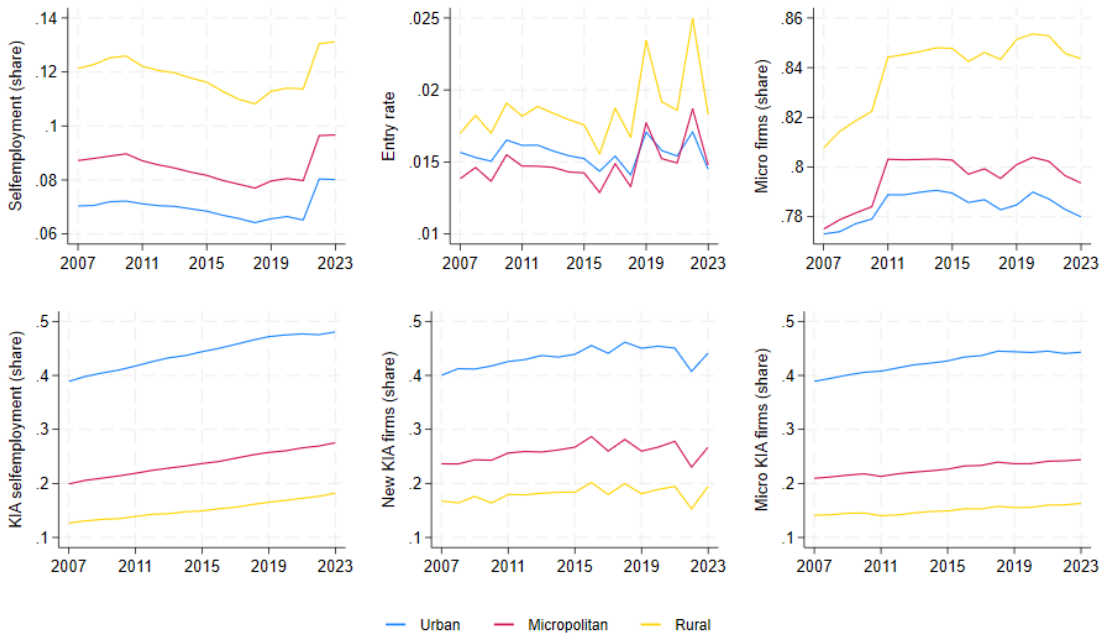

Figure 4. Change in entrepreneurship variables by municipality type, 2007-2023.

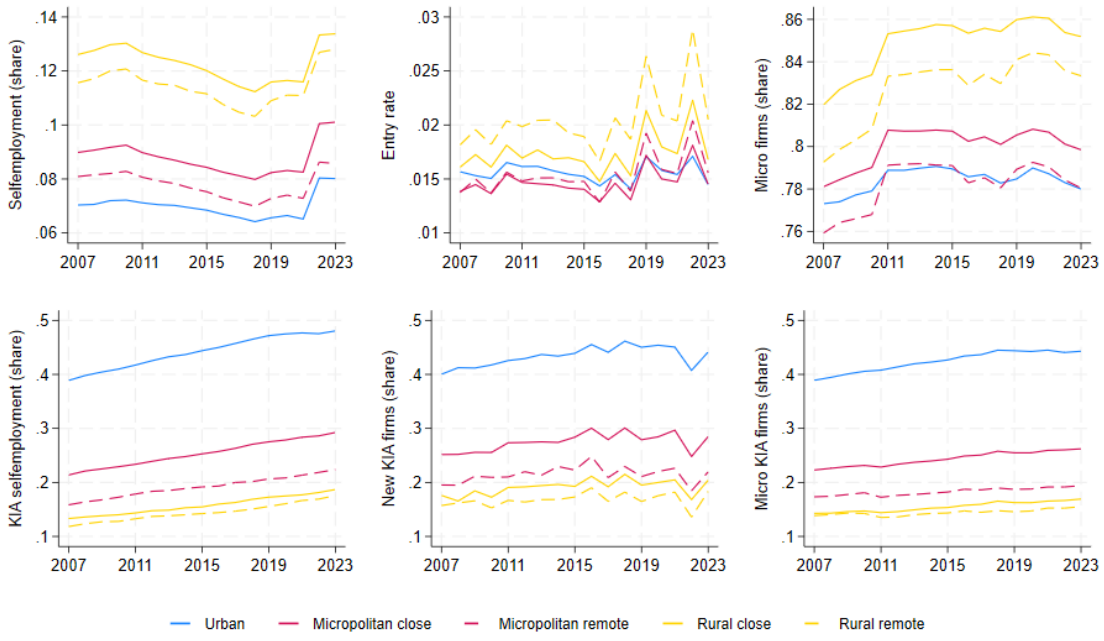

Figure 5. Change in entrepreneurship variables by municipality type, including close (solid lines) and remote (dashed lines) of non-urban municipalities, 2007-2023.

Tables 5 and 6 provide summary statistics for the two core entrepreneurship indicators, entry rate and share of micro firms, averaged over 2007 to 2022. Table 5 compares urban, micropolitan, and rural municipalities, while Table 6 adds a spatial dimension by distinguishing between close and remote non-urban regions. Across municipality types (Table 5), rural regions exhibit the highest average entry rates and the largest share of micro firms, reflecting a stronger reliance on small-scale businesses and new firm formation in less urbanized areas. Micropolitan regions occupy an intermediate position, while urban regions show lower entry rates and smaller shares of micro firms, consistent with more mature and diversified business environments.

Table 6 reveals that remoteness emphasizes these patterns. Remote rural areas have the highest share of micro firms, underscoring their dependence on small-scale entrepreneurial activity where wage employment opportunities are limited. Entry rates are also somewhat higher in remote areas, though the gap with close regions is less pronounced. Among micropolitan municipalities, proximity to urban centers correlates with slightly lower micro-firm shares and more dynamic entry rate fluctuations, suggesting that accessibility fosters entrepreneurial churn and market opportunities. Figures related to knowledge-intensive entrepreneurship (KIA) are presented in the appendix as complementary robustness checks.

Table 5. Descriptive statistics on entrepreneurship variables averaged over 2007-2022 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
Urban					
Entry rate	608	0.0146	0.0035	0.0095	0.0306
Selfemployment	608	0.0834	0.0338	0.0301	0.2369
Micro firms	608	0.7916	0.0542	0.6961	0.9105
New KIA firms	608	0.3761	0.0977	0.1750	0.6235
KIA selfemployment	608	0.3645	0.1142	0.1912	0.6595
Micro KIA firms	608	0.3593	0.1030	0.2015	0.6113
Micropolitan					
Entry rate	1,552	0.0147	0.0032	0.0061	0.0351
Selfemployment	1,552	0.0913	0.0343	0.0313	0.2504
Micro firms	1,552	0.7975	0.0501	0.6756	0.9145
New KIA firms	1,552	0.2454	0.0680	0.0880	0.4840
KIA selfemployment	1,552	0.2190	0.0665	0.0966	0.4362
Micro KIA firms	1,552	0.2146	0.0610	0.1045	0.4128
Rural					
Entry rate	2,480	0.0193	0.0066	0.0059	0.0846
Selfemployment	2,480	0.1218	0.0330	0.0417	0.2805
Micro firms	2,480	0.8338	0.0416	0.6520	0.9237
New KIA firms	2,480	0.1753	0.0681	0	0.5352
KIA selfemployment	2,480	0.1431	0.0526	0.0390	0.5008
Micro KIA firms	2,480	0.1451	0.0511	0.0348	0.4907

Notes: As the entrepreneurship variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

Table 6. Descriptive statistics on entrepreneurship variables averaged over 2007-2022 per close and remote non-urban regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
Micropolitan close					
Entry rate	1,136	0.0145	0.0031	0.0061	0.0280
Selfemployment	1,136	0.0962	0.0374	0.0313	0.2504
Micro firms	1,136	0.8047	0.0518	0.6756	0.9145
New KIA firms	1,136	0.2588	0.0709	0.1079	0.4840
KIA selfemployment	1,136	0.2319	0.0698	0.0998	0.4362
Micro KIA firms	1,136	0.2278	0.0638	0.1087	0.4128
Micropolitan remote					
Entry rate	416	0.0153	0.0035	0.0085	0.0351
Selfemployment	416	0.0780	0.0177	0.0417	0.1367
Micro firms	416	0.7778	0.0390	0.6769	0.8694
New KIA firms	416	0.2088	0.0416	0.0880	0.3573
KIA selfemployment	416	0.1836	0.0382	0.0966	0.3085
Micro KIA firms	416	0.1785	0.0316	0.1045	0.2578
Rural close					
Entry rate	1,344	0.0176	0.0049	0.0059	0.0412
Selfemployment	1,344	0.1254	0.0347	0.0526	0.2805
Micro firms	1,344	0.8439	0.0383	0.7143	0.9222
New KIA firms	1,344	0.1853	0.0712	0	0.5352
KIA selfemployment	1,344	0.1505	0.0598	0.0496	0.5008
Micro KIA firms	1,344	0.1507	0.0588	0.0348	0.4907
Rural remote					
Entry rate	1,136	0.0214	0.0077	0.0082	0.0846
Selfemployment	1,136	0.1175	0.0304	0.0417	0.2289
Micro firms	1,136	0.8219	0.0421	0.6520	0.9237
New KIA firms	1,136	0.1634	0.0623	0	0.4762
KIA selfemployment	1,136	0.1343	0.0409	0.0390	0.3215
Micro KIA firms	1,136	0.1384	0.0393	0.0431	0.3138

Notes: As the entrepreneurship variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

3.3 Control variables

Summary statistics averaged over 2007-2022, and correlations for the control variables are presented in Appendix C. Notably, there is a strong correlation between share of highly educated and knowledge-intensive entrepreneurial activities (measured as micro KIA firms).

3.4 Panel descriptives

Panel descriptive statistics for all outcomes and explanatory variables are presented in Appendix D. Most variables have sufficient within variation for fixed effects estimation, the exceptions being population (ln), employment (ln), and population density (ln), where within variation is close to or less than five percent of the overall variation.

4. The relationship between entrepreneurship and regional growth

Table 7 presents the results for the pooled OLS (POLS) and municipality fixed effects (FE) estimations for annual growth relationship between entrepreneurship and population, employment, productivity, and average wages, respectively, including the full set of control variables. The corresponding results for three- and five-year growth are shown in Appendix E (Tables E1-E2). From this table, which is the total of all regions, several patterns emerge. Starting with the share of micro firms, which is positively associated with population and employment growth in the OLS specification, and this relationship remains significant for population growth in the FE specification. This may suggest that regions with a higher prevalence of micro firms tend to expand in terms of residents as well as jobs, reinforcing the role of small-scale entrepreneurship in pushing extensive growth margins. However, the effect does not extend to productivity or wage growth, which may indicate that micro firms contribute more to quantity than "quality" of growth.

Entry rate shows a positive correlation with productivity and wage growth in the OLS models, consistent with the idea that new firm formation creates competitive environments and innovative milieus. However, these effects weakens or disappears in the FE formulation, which may imply that these associations are driven by cross-sectional differences rather than within-region changes. One potential trade-off this may suggest is that regions with high entry rates may experience short-term dynamics but not a long-term structural.

Regarding the control variables, human capital (share of highly educated) is a strong predictor of wage growth in FE models, aligning with standard growth theory. Sectoral specialization variables behave as expected: tourism intensity is positively related to population growth in POLS but not in FE, while manufacturing specialization correlates with productivity growth in pooled models.

Table 7. Relationship between entrepreneurship and one-year regional growth in population, employment, productivity, and average wage, 2007-2023. All regions.

	Population		*Employment*		*Productivity*		*Average Wage*	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0007	-0.0079	0.0007	-0.2186***	-0.1551***	-0.5959***	-0.0340***	-0.3336***
	(0.0005)	(0.0070)	(0.0007)	(0.0150)	(0.0281)	(0.0293)	(0.0061)	(0.0200)
Entry rate	-0.0200	-0.0206	0.0380	0.2732	0.9239**	-0.6388	0.1356**	0.0145
	(0.0516)	(0.0440)	(0.1102)	(0.1738)	(0.4362)	(0.4889)	(0.0625)	(0.1046)
Micro firms	0.0209***	0.0362**	0.0269**	-0.0189	-0.0517	-0.1798	-0.0211***	-0.0427
	(0.0055)	(0.0142)	(0.0109)	(0.0439)	(0.0501)	(0.1691)	(0.0075)	(0.0332)
LQ tourism	0.0020***	-0.0004	0.0013**	-0.0023	0.0041	-0.0049	0.0010***	-0.0005
	(0.0004)	(0.0011)	(0.0006)	(0.0022)	(0.0037)	(0.0085)	(0.0004)	(0.0021)
LQ mining	-0.0000**	-0.0001	0.0000	-0.0004**	0.0009***	0.0049***	0.0001***	0.0005**
	(0.0000)	(0.0001)	(0.0000)	(0.0002)	(0.0003)	(0.0011)	(0.0000)	(0.0002)
LQ manu-facturing	-0.0002	0.0003	-0.0014**	0.0041	0.0061**	0.0023	0.0011***	0.0098***
	(0.0003)	(0.0007)	(0.0005)	(0.0032)	(0.0025)	(0.0101)	(0.0003)	(0.0021)
Highly educated	-0.0064	0.0337	0.0126	0.1223*	0.0898***	0.0715	0.0129***	0.1685***
	(0.0061)	(0.0282)	(0.0091)	(0.0725)	(0.0285)	(0.3273)	(0.0042)	(0.0644)
Age 15-29	0.0324*	-0.0400	0.0031	0.0324	-0.0758	-0.5369	0.0155	0.1375**
	(0.0170)	(0.0313)	(0.0314)	(0.0826)	(0.0990)	(0.3324)	(0.0165)	(0.0690)
Age 65+	-0.0599***	0.0880***	-0.0866***	-0.1223**	-0.1103	-0.0625	-0.0024	0.1581***
	(0.0099)	(0.0230)	(0.0157)	(0.0544)	(0.0677)	(0.2267)	(0.0094)	(0.0498)
Population density (ln)	0.0016***		0.0003	0.1631***	0.0028	-0.0608	0.0012***	0.0221
	(0.0003)		(0.0004)	(0.0208)	(0.0031)	(0.0729)	(0.0003)	(0.0146)
Capital intensity (ln)	0.0008*	0.0008	0.0011	0.0045**	0.0260***	-0.0163	0.0012**	-0.0004
	(0.0005)	(0.0007)	(0.0009)	(0.0021)	(0.0050)	(0.0116)	(0.0005)	(0.0015)
Employment rate	0.0309***	0.0050	-0.0064	0.0130	0.0418	-0.3437**	0.0281***	0.1217***
	(0.0057)	(0.0127)	(0.0100)	(0.0381)	(0.0382)	(0.1554)	(0.0089)	(0.0278)
Region type								
Micropolitan close	-0.0005		-0.0011		-0.0082		-0.0004	
	(0.0010)		(0.0018)		(0.0053)		(0.0007)	
Micropolitan remote	-0.0023**		-0.0021		-0.0074		-0.0010	
	(0.0011)		(0.0020)		(0.0061)		(0.0008)	
Rural close	-0.0014		-0.0021		-0.0175**		-0.0020*	
	(0.0015)		(0.0025)		(0.0081)		(0.0011)	
Rural remote	-0.0035**		-0.0026		-0.0085		-0.0008	
	(0.0015)		(0.0026)		(0.0076)		(0.0011)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R^2	0.5569	0.3034	0.4064	0.4615	0.1266	0.3427	0.5300	0.6053
F-stat	73.59***	42.04***	75.80***	101.5***	15.41***	50.67***	249.8***	247.7***
N	4,640	4,640	4,640	4,640	4,640	4,640	4,640	4,640
n		290		290				290

Notes: Population density is omitted in specification FE (i) due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged one year. Base category for region type is urban.

4.1 Heterogeneity across municipality types

Since the main interest in the paper is on the relationship between entrepreneurship and growth in micropolitan regions, in comparison to other types of regions, we split the sample and rerun all estimations for micropolitan, urban, and rural regions, respectively. Tables 8-10 display the results for annual growth, while Appendix E presents the corresponding results for three- and five-year growth (Tables E3-E8).

Starting with Table 8, focusing on micropolitan regions, two main patterns stand out. First, the share of micro firms is consistently and positively associated with population growth. The coefficient in both POLS and FE (≈0.035-0.052) which could be interpreted as if there is a 10-percentage point increase in the micro firm share, the annual population growth is between 0.35 and 0.52 percentage points. This would suggest that small-scale entrepreneurship would support the extensive margin of micropolitan development, i.e., residential attraction/retention. The micro firm share is also positively related to employment growth in the POLS but loses significance in the FE specification, indicating that cross-section factors may be dominant. There is no robust relation with productivity or average wages, which is consistent with micro firms primarily expanding quantities rather than upgrading the intensive margin (e.g., efficiency).

The second pattern that stands out is the entry rate (new firm formation) which shows no stable one-year effects across outcomes in FE. The POLS signs are occasionally large but not significant. These imprecise results may suggest that short-run dynamism in start-ups does not translate into immediate, within-municipality growth changes once we clear from time-invariant heterogeneity.

Among the controls, there are some important takeaways regarding sectors which seem to matter for the quality of growth. Mining and manufacturing intensities are linked to higher productivity and wage growth (with mining dampening employment expansion), while population density exerts strong, positive effects on employment and wages, highlighting the importance of agglomeration dynamics in micropolitan settings. The human-capital share predicts employment growth in fixed-effects estimates, but wage and productivity effects are less robust once we account for time-invariant municipal characteristics.

While micropolitan regions show (Table 8) that small-scale entrepreneurship primarily drives demographic expansion rather than structural upgrading, the question remains whether these patterns hold in more urbanized contexts. Table 9 presents the corresponding estimates for Sweden's urban municipalities, allowing us to contrast the role of entrepreneurship and local conditions across the spatial hierarchy.

Table 8. Relationship between entrepreneurship and one-year regional growth in population, employment, productivity, and average wage, 2007-2023. Micropolitan regions.

	Population		*Employment*		*Productivity*		*Average Wage*	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y						-		
	0.0008	0.0121	0.0017	-0.2284***	-0.2417***	0.6398***	-0.0212	-0.2879***
	(0.0008)	(0.0100)	(0.0013)	(0.0302)	(0.0477)	(0.0422)	(0.0137)	(0.0371)
Entry rate	-0.0039	-0.0477	-0.0907	0.1239	0.2531	-1.2431	0.2426	0.4380
	(0.0965)	(0.1135)	(0.2784)	(0.3695)	(1.2280)	(1.7268)	(0.1832)	(0.2869)
Micro firms	0.0354***	0.0521**	0.0368**	-0.0259	-0.0158	0.0922	-0.0074	-0.0316
	(0.0074)	(0.0208)	(0.0160)	(0.0718)	(0.0980)	(0.3298)	(0.0121)	(0.0422)
LQ tourism	0.0021***	-0.0008	0.0053**	-0.0016	0.0236**	0.0097	0.0008	0.0003
	(0.0007)	(0.0015)	(0.0021)	(0.0060)	(0.0103)	(0.0286)	(0.0010)	(0.0037)
LQ mining	-0.0000	0.0001	0.0000	-0.0007***	0.0014***	0.0070***	0.0001***	0.0010***
	(0.0000)	(0.0001)	(0.0000)	(0.0002)	(0.0004)	(0.0011)	(0.0000)	(0.0003)
LQ manu-facturing	0.0002	0.0007	-0.0009	-0.0025	0.0155***	0.0020	0.0014*	0.0113**
	(0.0004)	(0.0015)	(0.0009)	(0.0064)	(0.0050)	(0.0240)	(0.0008)	(0.0046)
Highly educated	0.0037	0.0181	0.0107	0.1546*	0.1293*	0.6346	0.0205**	0.1862
	(0.0066)	(0.0244)	(0.0130)	(0.0910)	(0.0707)	(0.6788)	(0.0092)	(0.1185)
Age 15-29	0.0835***	-0.0668	0.0315	-0.0684	-0.3867*	-0.4643	0.0121	0.1360
	(0.0223)	(0.0436)	(0.0549)	(0.1331)	(0.2206)	(0.6653)	(0.0251)	(0.1163)
Age 65+	-0.0111	0.1375***	-0.0541**	0.0106	-0.4056***	-0.9540	-0.0099	0.2527**
	(0.0104)	(0.0337)	(0.0207)	(0.1039)	(0.1492)	(0.6291)	(0.0113)	(0.0986)
Population density (ln)	0.0021***		0.0007	0.1454***	-0.0039	-0.4062**	0.0008	0.0941***
	(0.0003)		(0.0007)	(0.0368)	(0.0057)	(0.1669)	(0.0005)	(0.0273)
Capital intensity (ln)	0.0008	0.0005	-0.0002	0.0048	0.0277**	0.0087	0.0003	0.0033
	(0.0007)	(0.0012)	(0.0014)	(0.0035)	(0.0109)	(0.0171)	(0.0009)	(0.0033)
Employment rate	0.0365***	-0.0151	0.0365**	0.0807	-0.0318	-0.7374**	0.0286**	0.0273
	(0.0073)	(0.0186)	(0.0177)	(0.0686)	(0.0937)	(0.2878)	(0.0115)	(0.0492)
Remote	-0.0021***	-0.0021***	-0.0009	-0.0009	-0.0012	-0.0012	-0.0003	-0.0003
	(0.0005)	(0.0005)	(0.0010)	(0.0010)	(0.0054)	(0.0054)	(0.0006)	(0.0006)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R^2	0.5176	0.3455	0.4902	0.5514	0.1787	0.3664	0.6715	0.7214
F-stat	120.4***	32.51***	43.55***	66.77***	9.846***	29.90***	225.1***	235.5***
N	1,552	1,552	1,552	1,552	1,552	1,552	1,552	1,552
n		97		97		97		97

Notes: Population density is omitted in specification FE (i) due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged one year.

The results for the urban municipalities differ substantially from those of the micropolitan areas. The share of micro firms is now negatively associated with any of the growth outcomes and are only significant in the FE specifications. The productivity outcome is the exception which is not significant in any of the specifications. Together, it seems like in large urban economies, a higher concentration of micro firms may indicate structural fragmentation and weaker competitiveness rather than entrepreneurial dynamics. Unlike the micropolitan regions, where micro firms are associated with population growth, urban areas appear to benefit from scale and potentially also firm maturity. The entry rate shows no significant effect on population or employment growth in the FE specification. If anything, the sign turns negative for productivity growth over longer horizons, indicating that high start-up churn may not translate into sustained upgrading in urban settings.

Turning to some of the important controls, human capital emerges as the strongest predictor of wage growth, underscoring the premium on skills in metropolitan economies. Sectoral specialization,

particularly manufacturing, supports productivity and wage upgrading, while tourism intensity appears to dampen wage dynamics. Overall, urban growth trajectories seem to depend more on structural and human-capital factors than on small-scale entrepreneurship.

Table 9. Relationship between entrepreneurship and one-year regional growth in population, employment, productivity, and average wage, 2007-2023. Urban regions.

	Population		*Employment*		*Productivity*		*Average Wage*	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	-0.0018**	0.0142	0.0015	-0.1464***	-0.1162***	-0.4570***	-0.0338***	-0.3120***
	(0.0008)	(0.0155)	(0.0012)	(0.0288)	(0.0299)	(0.0602)	(0.0118)	(0.0486)
Entry rate	-0.0920	-0.2763	0.1921	0.2572	1.8218	-3.2855*	-0.0380	-0.5682
	(0.2804)	(0.3381)	(0.4581)	(1.1099)	(1.0918)	(1.8682)	(0.2028)	(0.4329)
Micro firms	-0.0066	-0.1107**	-0.0200	-0.2702*	-0.0739	-0.4303	-0.0125	-0.1563**
	(0.0155)	(0.0494)	(0.0247)	(0.1391)	(0.0820)	(0.4651)	(0.0124)	(0.0692)
LQ tourism	0.0016	-0.0071*	-0.0110***	-0.0171	0.0019	0.0411	-0.0004	0.0058
	(0.0015)	(0.0040)	(0.0023)	(0.0123)	(0.0065)	(0.0269)	(0.0012)	(0.0068)
LQ mining	-0.0048**	-0.0038	-0.0029	-0.0039	-0.0125	-0.0127	0.0018	-0.0027
	(0.0019)	(0.0024)	(0.0041)	(0.0056)	(0.0082)	(0.0196)	(0.0024)	(0.0038)
LQ manu-facturing	0.0002	0.0014	-0.0014	0.0047	0.0253**	0.0176	0.0014	0.0120**
	(0.0011)	(0.0026)	(0.0015)	(0.0057)	(0.0099)	(0.0153)	(0.0012)	(0.0044)
Highly educated	-0.0068	-0.1001*	0.0136	0.0852	0.0611**	-0.2237	0.0143*	0.2850***
	(0.0099)	(0.0588)	(0.0156)	(0.1566)	(0.0293)	(0.3867)	(0.0071)	(0.0767)
Age 15-29	0.0432	0.0280	-0.1204	-0.1655	0.0973	-1.5683***	0.0471	0.0555
	(0.0537)	(0.0935)	(0.0758)	(0.2595)	(0.1595)	(0.5416)	(0.0345)	(0.1296)
Age 65+	-0.1047**	0.1603**	-0.2015**	-0.1900	-0.2288	0.4515	-0.0085	0.0756
	(0.0424)	(0.0627)	(0.0821)	(0.2315)	(0.1414)	(0.6540)	(0.0377)	(0.1334)
Population density (ln)	0.0011		-0.0020	0.1128	0.0046	-0.1256	0.0018**	-0.0287
	(0.0009)		(0.0015)	(0.0677)	(0.0029)	(0.1414)	(0.0007)	(0.0317)
Capital intensity (ln)	0.0013	-0.0004	0.0060***	0.0062	0.0123	0.0086	0.0002	-0.0040**
	(0.0013)	(0.0013)	(0.0017)	(0.0045)	(0.0075)	(0.0114)	(0.0011)	(0.0015)
Employment rate	0.0167	0.0386	-0.0048	0.2107	0.0787	-0.4171	0.0201	0.0819
	(0.0148)	(0.0450)	(0.0274)	(0.1660)	(0.0644)	(0.3685)	(0.0131)	(0.0986)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R^2	0.3470	0.3074	0.3469	0.3863	0.1893	0.3645	0.6813	0.7348
F-stat	20.41***	25.39***	98.63***	54.10***	26.69***	29.77***	144***	284.7***
N	608	608	608	608	608	608	608	608
n		38		38		38		38

Notes: Population density is omitted in specification FE (i) due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged one year.

Table 10 is the corresponding version of Table 8 and 9, but for rural municipalities. Again, starting with the micro firms which is positively associated with population and employment growth in the POLS specifications, but negatively related with productivity and wage growth. These cross-sectional relationships suggest that rural areas with many micro firms expand on the extensive margin (residents and jobs), while not necessarily upgrading the intensive margin (efficiency and wages). However, these effects do not remain in the FE specifications, which may indicate that they are largely driven by between municipality differences rather than within-place changes over time.

As contrast to micro firms, the entry rate shows a positive FE effect on employment growth. In the OLS specification, entry is also positively correlated with productivity and average wages, but those

associations do not remain in the FE model. Again, this would imply that within municipality start-up increases mainly translate to job creation in the short run rather than immediate upgrading of wages and/or productivity. Looking at the controls, we see that sectoral composition matters as tourism raises employment (and population cross-sectionally), mining increases productivity and pay (average wages) with limited job expansion, and manufacturing supports both employment and wage growth. Densification yields clear gains in employment and wages even in rural contexts (robust across three- and five-year growth), and higher employment rates contemporaneously push up wages. Hence, non-urban regions seem to have the most to "win" from increased density.

Table 10. Relationship between entrepreneurship and one-year regional growth in population, employment, productivity, and average wage, 2007-2023. Rural regions.

	Population		*Employment*		*Productivity*		*Average Wage*	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0014**	-0.0177*	-0.0004	-0.2447***	-0.1459***	-0.6134***	-0.0452***	-0.3786***
	(0.0006)	(0.0100)	(0.0011)	(0.0207)	(0.0341)	(0.0380)	(0.0085)	(0.0276)
Entry rate	0.0433	-0.0009	0.1051	0.3811*	1.1423*	-0.2048	0.1747**	-0.0221
	(0.0489)	(0.0490)	(0.1376)	(0.1956)	(0.5902)	(0.5624)	(0.0850)	(0.1284)
Micro firms	0.0120*	0.0228	0.0366**	-0.0095	-0.1478*	-0.2284	-0.0519***	-0.0631
	(0.0071)	(0.0194)	(0.0154)	(0.0626)	(0.0880)	(0.2047)	(0.0147)	(0.0462)
LQ tourism	0.0017***	0.0006	0.0012	-0.0022	0.0007	-0.0121	0.0015***	-0.0012
	(0.0003)	(0.0012)	(0.0007)	(0.0024)	(0.0036)	(0.0103)	(0.0005)	(0.0023)
LQ mining	0.0000	-0.0001	0.0001	-0.0003	0.0004	0.0038***	0.0001**	0.0005**
	(0.0000)	(0.0001)	(0.0001)	(0.0003)	(0.0004)	(0.0014)	(0.0001)	(0.0002)
LQ manu-facturing	0.0002	0.0002	-0.0007	0.0088**	0.0026	-0.0002	0.0009**	0.0089***
	(0.0004)	(0.0009)	(0.0008)	(0.0040)	(0.0024)	(0.0117)	(0.0004)	(0.0024)
Highly educated	0.0167	0.1513***	0.0411	0.0872	0.1783*	-0.2224	-0.0050	0.0753
	(0.0172)	(0.0419)	(0.0295)	(0.0966)	(0.1064)	(0.4102)	(0.0129)	(0.0893)
Age 15-29	-0.0348	-0.0686	0.0245	0.1117	0.1153	-0.2101	-0.0202	0.1103
	(0.0244)	(0.0452)	(0.0657)	(0.1088)	(0.1990)	(0.4491)	(0.0354)	(0.1038)
Age 65+	-0.0846***	0.0397	-0.0864***	-0.0934	0.0029	0.3342	-0.0135	0.0793
	(0.0108)	(0.0305)	(0.0254)	(0.0698)	(0.0858)	(0.2731)	(0.0151)	(0.0690)
Population density (ln)	0.0014***		0.0004	0.1845***	0.0045	0.0273	0.0018***	0.0516**
	(0.0003)		(0.0006)	(0.0256)	(0.0044)	(0.0900)	(0.0004)	(0.0199)
Capital intensity (ln)	0.0004	0.0008	0.0011	0.0024	0.0301***	-0.0345**	0.0016**	0.0002
	(0.0006)	(0.0010)	(0.0012)	(0.0027)	(0.0076)	(0.0163)	(0.0007)	(0.0021)
Employment rate	0.0228***	0.0204	-0.0324**	-0.0180	0.0631	-0.2532	0.0362**	0.1967***
	(0.0084)	(0.0178)	(0.0156)	(0.0507)	(0.0566)	(0.2014)	(0.0160)	(0.0348)
Remote	-0.0017***		-0.0002		0.0059		0.0009	
	(0.0005)		(0.0011)		(0.0044)		(0.0006)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R^2	0.4997	0.3496	0.3829	0.4695	0.1358	0.3623	0.4505	0.5482
F-stat	49.79***	30.40***	43.06***	62.45***	13.88***	45.63***	124.7***	104.8***
N	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480
n		155		155		155		155

Notes: Population density is omitted in specification FE (i) due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged one year.

4.2 Knowledge-intensive entrepreneurial activities

To test the potential importance of knowledge-intensive entrepreneurship, we include the share of micro firms that conduct knowledge-intensive activities (KIA). As discussed before, this measure is highly correlated with both share of new KIA firms and KIA self-employment, as well as share of highly educated individuals in the municipality. Hence, it is difficult to trace whether it is knowledge-intensive entrepreneurship that matters or simply knowledge-intensity in general. As the only difference to the estimations shown in Tables 7-10 is the inclusion of micro KIA firms, which replaces share of highly educated, the results for knowledge-intensive entrepreneurship (KIA) are summarized in Figures 6-9[9].

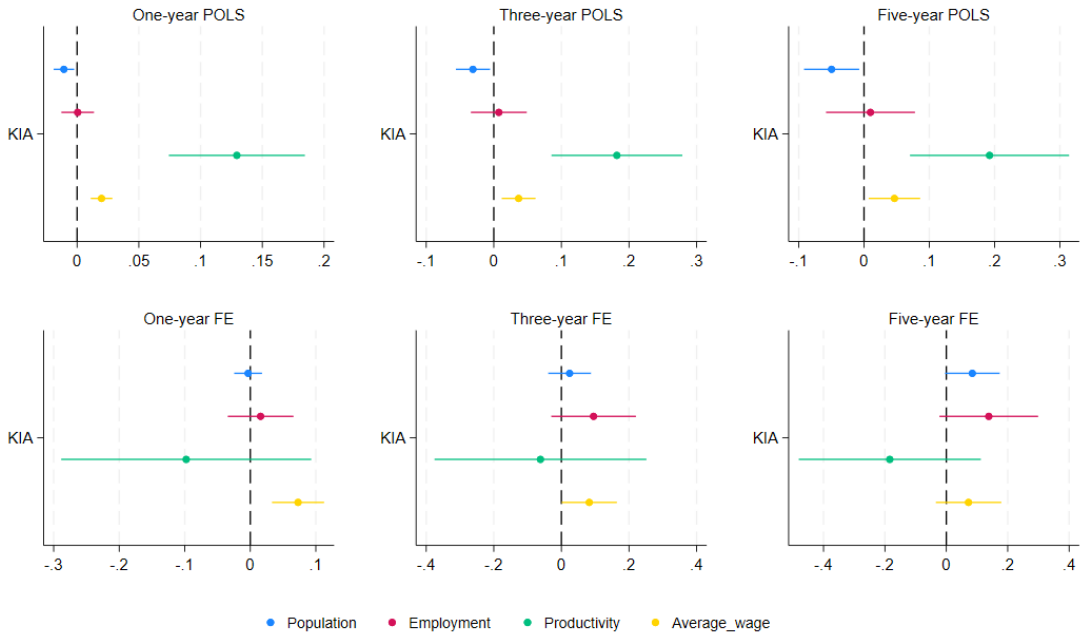

Figure 6. Point estimates and 90 percent confidence intervals for share of micro KIA firms. All regions.

[9] Full regression results can be obtained from the corresponding author.

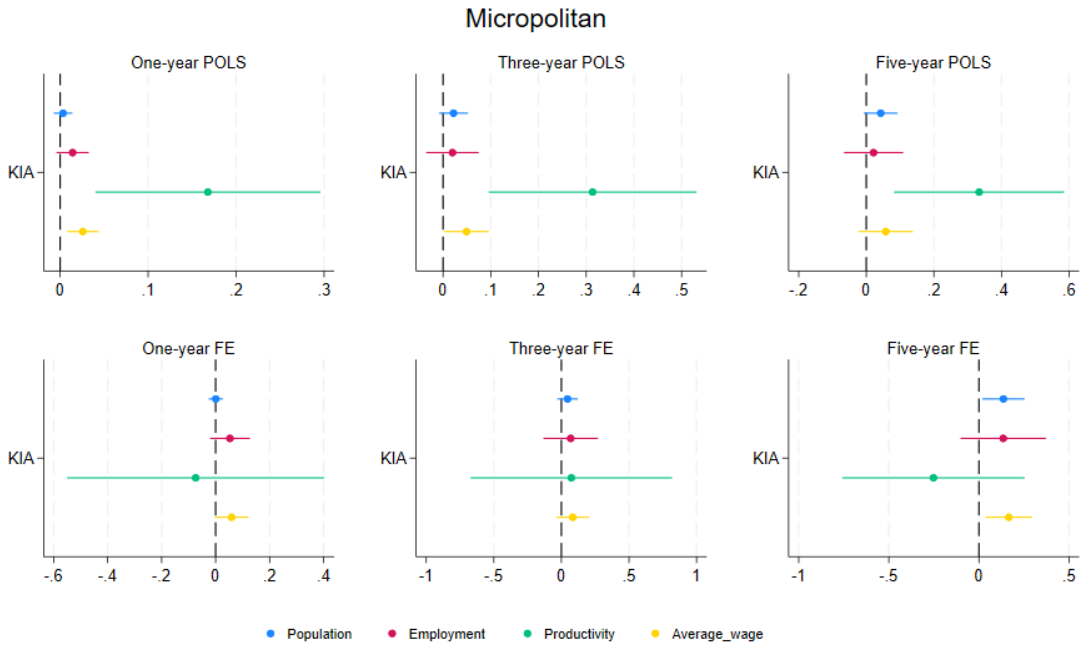

Figure 7. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Micropolitan regions.

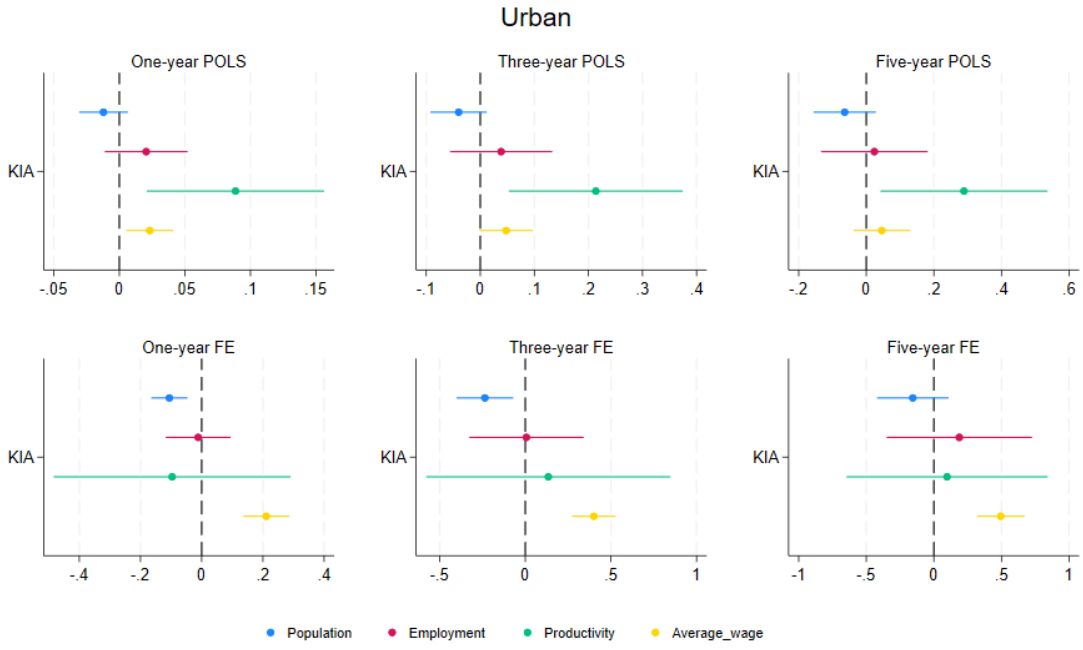

Figure 8. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Urban regions.

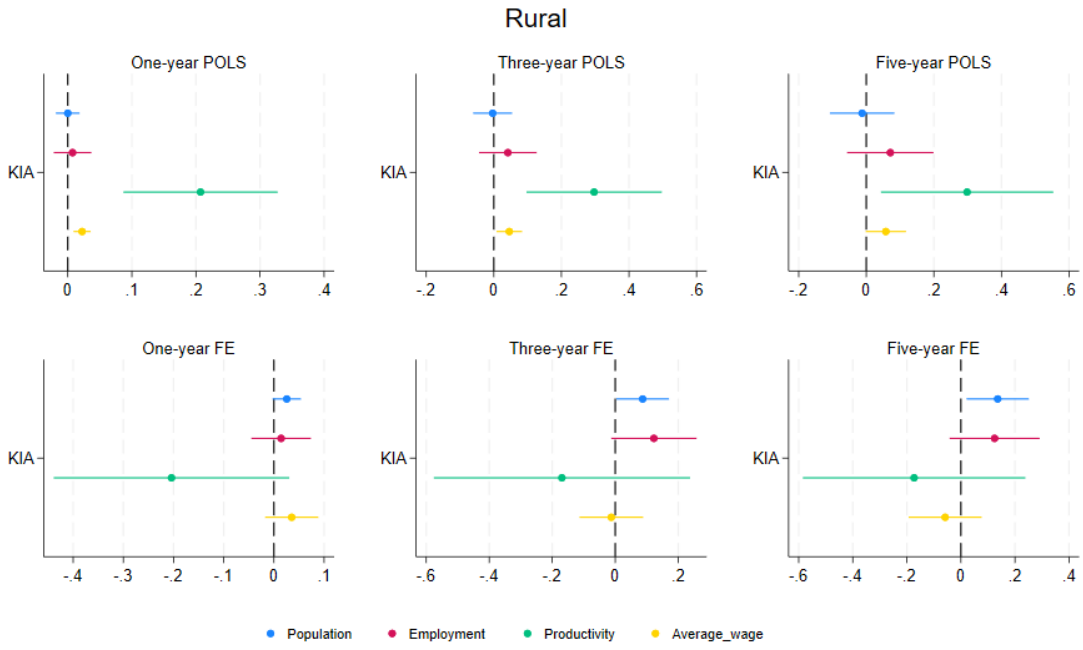

Figure 9. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Rural regions.

When looking across regions (POLS), there is a strong positive relationship between knowledge-intensive entrepreneurship and productivity growth, both in the short- and intermediate term, which is visible for all types of regions. However, this relationship disappears when controlling for unobserved municipality heterogeneity (FE estimations), implying that there is something else in the municipalities that drives both knowledge-intensity and productivity growth. On the other hand, the positive relationship between KIA and average wage growth persists in the short run in the FE estimations (three-year significant at ten percent level) but decreases as the growth window expands to five years. It should be noted that the effect of KIA entrepreneurship on annual wage growth is robust to the inclusion of share of highly educated as control variable. When included simultaneously, both micro KIA firms and highly educated stay positive and significant, although at somewhat smaller magnitudes.

For micropolitan regions, on the other hand, knowledge-intensive (entrepreneurial) activities have a significant positive impact on five-year growth in population and average wages, while the short-run effect is not visible. May take longer in these regions to translate knowledge-intensity into growth, maybe due to less absorptive capacity, less competence, to "handle" these types of firms. Here, micropolitan regions differ from both urban regions, which show a strong positive impact of KIA activities on average wages in all studied growth windows (although the annual average effect diminishes with the longer growth rates), and rural regions, which see no wage growth effect no matter the time window. In regard to the effect on population growth, micropolitan and rural regions do however show similar patterns, while one- and three-year population growth in urban regions is negatively affected by a greater share of KIA firms.

4.3 Interactions between local factors and entrepreneurship in micropolitan regions

Focusing on micropolitan regions, we interact the entrepreneurship indicators with various local factors. First, we explore the interaction between entry rate, micro firms (same regression), and KIA (separate regression, excluding share highly educated), and being remotely located. Results for the variables of main interest from the fixed effects estimations are displayed in Figure 10.

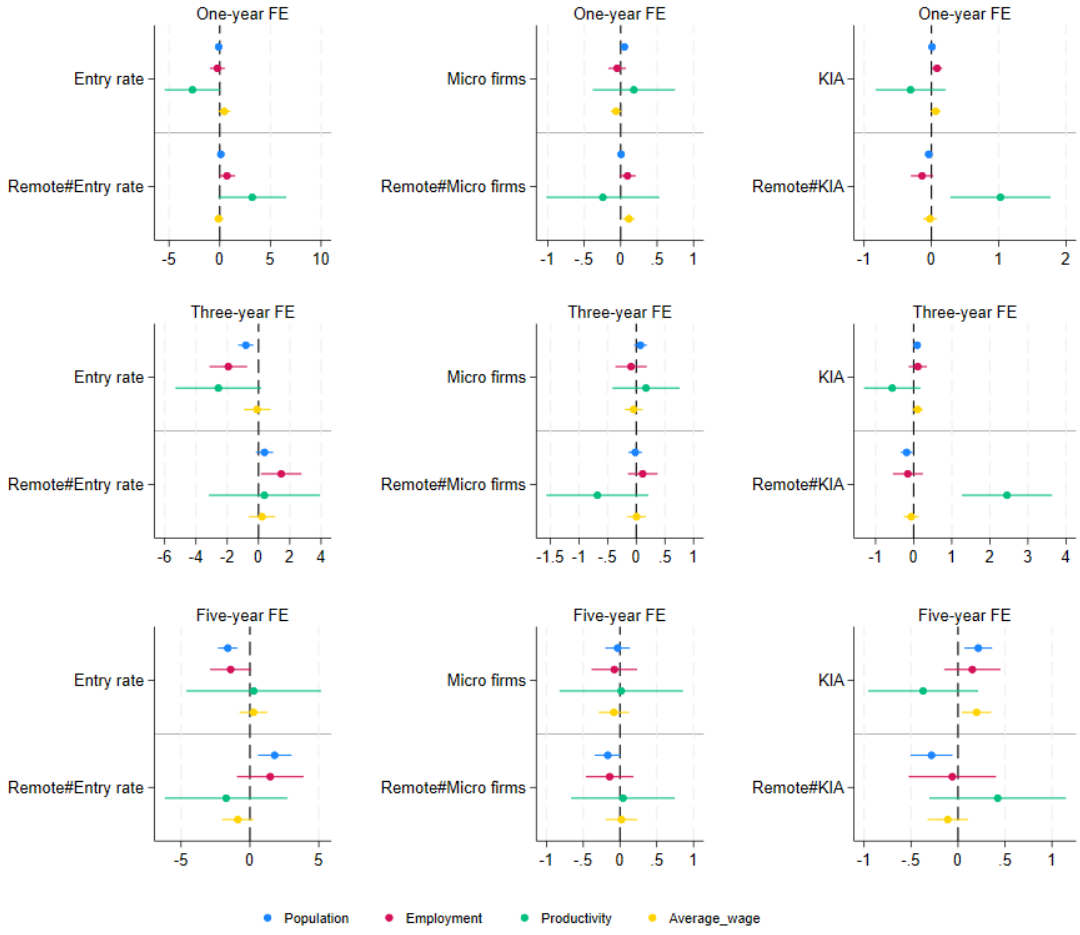

Figure 10. Interaction between entrepreneurship indicators and remoteness. Micropolitan regions.

Micro firms are positively associated with annual population growth, as seen before, no matter whether remote or not. Micro firms are positively related to annual average wage growth in remote regions only.

The negative effect of entry rate on three- and five-year population and employment growth in micropolitan regions is driven by non-remote regions. Higher start-up rate is still not positive in remote regions (but also not negative).

Knowledge-intensive entrepreneurship is especially important for productivity growth (one- and three-year) in remote micropolitan regions, which may be related to mining as mining-intensity is very high in remote micropolitan regions. This result is not visible for rural regions.

For non-remote regions, greater share of KIA firms (among micro firms) is positively related to annual employment growth. Micro KIA firms a driver for three- and five-year population growth in non-remote micropolitan regions, but significantly less in remote regions. Micro KIA firms are positively associated with average wage growth over five years, same result as before for micropolitan regions. No significant difference between remote and non-remote regions.

Figure 11 presents the estimates for entrepreneurship indicators and LQ tourism, including their interaction.

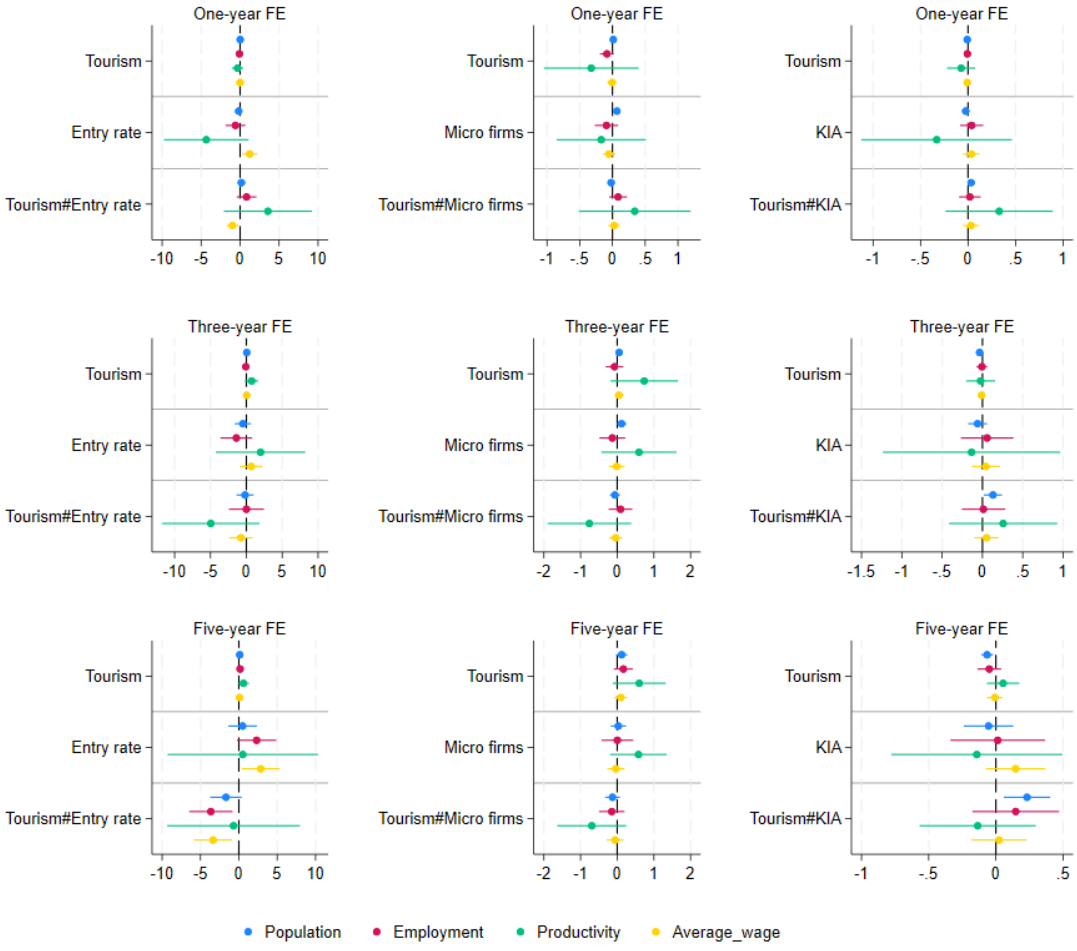

Figure 10. Interaction between entrepreneurship indicators and tourism intensity. Micropolitan regions.

There are few effects of tourism in itself, we only find a negative effect on three- and five-year population growth in KIA estimations. However, higher tourism intensity together with relatively more KIA entrepreneurship seems to boost population growth over the three- and five-year time horizons. Hence, the positive effect of higher rates of KIA entrepreneurship on population growth found before appears partly driven by non-remote regions that increase their relative tourism-intensity. Tourism in combination with knowledge-intensity thus seems to be an attractive feature for new inhabitants, at least in non-remote micropolitan regions. A similar result can be found for rural regions, while we find no

evidence of an interaction effect between tourism and KIA entrepreneurship on population growth in urban regions.

One- and five-year average wage growth is however negatively affected by higher entry rates in combination with higher tourism intensity, indicating that new firms within the tourism sector dampens wage growth in the short and somewhat longer term. Entry rate in itself is however positive for average wage growth in the one- and five-year time horizons. Hence, it appears as if new firms within the tourism sector pay relatively low wages, while new firm formation is otherwise positive for wage growth in micropolitan regions. Additionally, the interaction between tourism and entry rate is negative and significant for five-year growth in employment, which may be related to the relatively slower wage growth making the region less attractive for new employees.

Micro firms show no interaction effects with tourism. Same result as before with a positive relationship with annual population growth.

4.4 Robustness checks

As a robustness check to the fixed-effects estimates, we estimate dynamic panel models using system GMM (Arellano and Bond, 1991, Blundell and Bond, 1998). These models address the bias from including a lagged dependent variable (Nickell, 1981) and potential endogeneity of the entrepreneurship measures. In all GMM specifications, the lagged dependent variable and the entrepreneurship measures are thus treated as endogenous (not only predetermined) and instrumented with lagged levels and differences from periods t-2 to $t-4$, using collapsed instrument sets and the two-step heteroskedasticity-robust estimator with Windmeijer's (2005) finite-sample correction. For population growth, all control variables are included as standard instruments, and the specification passes the AR(2) and Hansen tests. For employment and wage growth, persistent demographic and population density controls are excluded from the IV set (while being kept as regressors), and the instrument set is trimmed by restricting the IVs to sectoral specialization and capital intensity, and (for wages) human capital and the employment rate. These adjustments yield well-behaved diagnostics with no evidence of second-order serial correlation, and valid instrument sets according to insignificant Hansen p-values. For productivity growth, we again use lag(2–4) GMM-style instruments and a reduced IV set for the controls, yielding acceptable the AR(2) and overall Hansen tests, but coefficients are imprecisely estimated and subset Hansen tests indicate some sensitivity to the treatment of municipality types.

Overall, we find that the System GMM estimates and diagnostics tests are relatively sensitive to alternative specifications (specific IV set, lag depth and length etc.). This is consistent with prior work noting that the estimator can be unstable when instruments are weak, when panels are relatively short, or when persistence varies across regressors (Bun and Windmeijer, 2010, Roodman, 2009b). Hence, the results presented in Table 10 (all regions) and Table 11 (micropolitan regions) should be interpreted with some caution. This is especially the case for estimations on the different region types due to the relatively smaller number of observations, making GMM unstable and unreliable (Judson and Owen, 1999, Roodman, 2009b, Arellano and Bond, 1991). The estimates for urban and rural regions are insignificant throughout and thus not displayed here.

The GMM models confirm the FE-LDV estimates for micro firms, that a larger share of micro firms in the municipality has a positive effect on annual population growth. The GMM estimates also indicate a positive effect on employment growth. Similarly, GMM supports that the positive relationship between micro firms and population growth is driven by micropolitan regions. However, the results should be interpreted with caution as the Arellano-Bond test for serial correlation (AR(2)) in first differences is significant at five percent level.

Table 10. Relationship between entrepreneurship and one-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. All regions.

	System GMM (i)	System GMM (ii)	System GMM (iii)	System GMM (iv)
ln Y	0.0276***	-0.5262**	-0.6133**	-1.3472***
	(0.0079)	(0.2601)	(0.2913)	(0.4298)
Entry rate	-0.0982	-2.9857	18.562	-2.2487
	(0.2655)	(7.0271)	(60.27)	(2.8691)
Micro firms	0.1553***	1.5514**	-3.3073	-0.8629
	(0.0581)	(0.7197)	(20.92)	(0.7821)
LQ tourism	-0.0005	0.0541	0.0229	-0.0082
	(0.0021)	(0.0432)	(0.1155)	(0.0316)
LQ mining	0.0001*	-0.0000	0.0033	0.0181*
	(0.0001)	(0.0020)	(0.0227)	(0.0093)
LQ manu-facturing	0.0027**	0.0772	-0.0735	0.0666**
	(0.0013)	(0.0505)	(0.2802)	(0.0296)
Highly educated	-0.0444	2.9302*	-2.0692	0.8149*
	(0.0272)	(1.7716)	(9.7258)	(0.4614)
Age 15-29	-0.1344	5.7245	-5.6945	-7.5014**
	(0.1418)	(8.8944)	(60.28)	(3.0712)
Age 65+	0.0525	0.8819	-5.5885	1.9098
	(0.0506)	(0.7952)	(29.39)	(1.2833)
Population density (ln)		0.0277	-0.0149	0.0711*
		(0.0458)	(0.5065)	(0.0373)
Capital intensity (ln)	-0.0012	0.1669**	0.0560	-0.0280
	(0.0023)	(0.0778)	(0.1364)	(0.0327)
Employment rate	0.0542*	0.2751	-6.8242	-0.9873**
	(0.0288)	(0.9987)	(7.8937)	(0.4003)
Region type				
Micropolitan close	0.0047	-0.1490	0.0118	-0.1937**
	(0.0047)	(0.3076)	(0.8419)	(0.0830)
Micropolitan remote	0.0007	0.0122	-0.0579	-0.3128***
	(0.0051)	(0.2512)	(0.9184)	(0.1076)
Rural close	0.0194*	-0.6633	0.0208	-0.3530***
	(0.0099)	(0.5504)	(0.8801)	(0.1336)
Rural remote	0.0224**	-0.5784	-0.1340	-0.3294***
	(0.0104)	(0.5159)	(1.1087)	(0.1267)
Year FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
F-stat	35.34***	44.42***	2.972***	54.90***
AR(2) p-value	0.684	0.489	0.918	0.684
Hansen p-value	0.613	0.700	0.292	0.248
N	4,640	4,640	4,640	4,640
n	290	290	290	290

Notes: Population density is omitted in specification (i) due to collinearity with the lagged dependent variable, Y. Robust standard errors in parenthesis. All explanatory variables are lagged one year. Base category for region type is urban.

For urban regions (results not displayed), micro firms show the negative sign in relation to both population and employment growth (as found in FE-LDV) but standard errors are large and estimates insignificant. Estimations on urban regions are however the most unreliable in the GMM framework as the number of instruments is close to the number of groups (Roodman, 2009b).

Table 11. Relationship between entrepreneurship and one-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Micropolitan regions.

	System GMM (i)	System GMM (ii)	System GMM (iii)	System GMM (iv)
ln Y	0.0125	0.0336	-0.9251	0.2241
	(0.0194)	(0.0776)	(0.9991)	(0.2440)
Entry rate	-0.3876	3.5366	24.8330	6.5242
	(0.6713)	(5.4785)	(57.84)	(6.2099)
Micro firms	0.2383***	0.5712	-1.6843	-0.9315
	(0.0519)	(0.7895)	(18.33)	(0.8278)
LQ tourism	-0.0018	-0.0158	0.1673	0.0234
	(0.0054)	(0.0337)	(1.3662)	(0.0269)
LQ mining	0.0001	0.0003	-0.0106	-0.0017
	(0.0001)	(0.0017)	(0.0233)	(0.0017)
LQ manu-facturing	0.0048*	0.0215	0.1807	-0.0133
	(0.0025)	(0.0194)	(1.3262)	(0.0177)
Highly educated	0.0229	0.2891	2.2563	-0.3470
	(0.0652)	(0.7646)	(42.9553)	(0.3321)
Age 15-29	0.2302	-1.7036	-22.26	-1.2908
	(0.3949)	(2.5401)	(106.9)	(2.7932)
Age 65+	0.0532	-1.1366	-15.0459	-1.4182
	(0.0680)	(1.0947)	(20.39)	(1.1097)
Population density (ln)		-0.0198	-0.4934	-0.0228
		(0.0347)	(1.4402)	(0.0222)
Capital intensity (ln)	0.0054**	0.0239	0.2498	-0.0325
	(0.0024)	(0.0285)	(0.8988)	(0.0324)
Employment rate	-0.0139	-1.0906*	-4.1314	0.0386
	(0.0296)	(0.5946)	(7.3467)	(0.4355)
Remote	-0.0030	0.0062	-0.0622	-0.0059
	(0.0020)	(0.0209)	(0.4133)	(0.0151)
Year FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
F-stat	33.39***	44.56***	2.330***	98.31***
AR(2) p-value	0.037	0.847	0.900	0.096
Hansen p-value	0.841	0.129	0.563	0.214
N	1,552	1,552	1,552	1,552
n	155	155	155	155

Notes: Population density is omitted in specification (i) due to collinearity with the lagged dependent variable, Y. Robust standard errors in parenthesis. All explanatory variables are lagged one year.

GMM estimations on knowledge-intensive entrepreneurial activities, keeping the same GMM specifications as outlined above except for replacing share of highly educated with share of micro KIA firms support the positive effect of knowledge-intensity on average wage growth. The estimate for KIA entrepreneurship is somewhat smaller (0.3631) than for highly educated (0.8149, Table 10), although with higher significance (five percent versus ten percent). Diagnostics do however point to serial correlation and the Hansen test rejects the null hypothesis of instrument validity, indicating that the instrument set is not consistent with the model's identifying assumptions.

5. Conclusions

This study set out to explore whether entrepreneurship drives regional growth in Sweden's micropolitan regions, municipalities located between metropolitan cores and rural peripheries, and how these dynamics compare across the urban–rural space. Using longitudinal data for all 290 municipalities (2007 to 2023) and dynamic panel models, we find that entrepreneurship matters, but its effects are strongly place-contingent.

In micropolitan regions, a higher share of micro firms is robustly associated with population growth, suggesting that small-scale entrepreneurship primarily supports demographic expansion rather than structural upgrading. Entry rates show limited short-run effects on productivity or wages, indicating that start-up dynamism does not immediately translate into quality-driven growth. Urban regions display an opposite pattern. There, micro-firm prevalence correlates negatively with population, employment, and wage growth, while human capital and manufacturing specialization dominate as drivers of wage and productivity upgrading. Rural regions resemble micropolitan areas in their reliance on micro firms for extensive growth margins but differ in that entry rates positively affect employment growth and tourism intensity plays a stronger role in shaping demographic and labor-market outcomes.

These findings underscore the importance of entrepreneurship for growth beyond metropolitan areas but also highlight that its impact depends on local conditions such as sectoral structure, agglomeration, and human capital. Micropolitan regions occupy a unique position: they are neither scaled-down cities nor enlarged rural towns, and their growth trajectories reflect a mix of opportunities and vulnerabilities tied to their intermediate status.

There are a number of future research paths to take from here. First, one could explore firm-level dynamics to disentangle whether micro firms in micropolitan regions are necessity-driven or opportunity-driven, and how this distinction affects growth outcomes. Second, examining sector-specific entrepreneurship, for example, digital services or green and sustainable technologies, could reveal whether certain activities offer stronger upgrading potential in intermediate regions. Third, comparative studies across countries would help assess whether the patterns observed here reflect Sweden's institutional context or broader structural features of micropolitan economies. Finally, integrating migration and housing market data could clarify how entrepreneurship interacts with place attractiveness and demographic change, offering a broader view of regional resilience.

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Appendix A – Industries performing knowledge-intensive activities

Table A1. Definition of knowledge-intensive activities (KIA), based on NACE rev 2 (SNI2007).

Industry	Definition
09	Mining support service activities
19	Manufacture of coke and refined petroleum products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
26	Manufacture of computer, electronic and optical products
51	Air transport
58	Publishing activities
59	Motion picture, video and television programme production and pharmaceutical preparations
60	Programming and broadcasting activities
61	Telecommunications
62	Computer programming, consultancy and related activities
63	Information service activities
64	Financial service activities, except insurance and pension funding
65	Insurance, reinsurance and pension funding, except compulsory social security
66	Activities auxiliary to financial services and insurance activities
69	Legal and accounting activities
70	Activities of head offices; management consultancy activities
71	Architectural and engineering activities; technical testing and analysis
72	Scientific research and development
73	Advertising and market research
74	Other professional, scientific and technical activities
75	Veterinary activities
78	Employment activities
79	Travel agency, tour operator reservation service and related activities
84	Public administration and defence; compulsory social security
85	Education
86	Human health activities
90	Creative, arts and entertainment activities
91	Libraries, archives, museums and other cultural activities
94	Activities of membership organisations
99	Activities of extraterritorial organisations and bodies

Source: Eurostat

Appendix B – Correlation matrices for outcome variables

Table B1. Correlation matrix for outcome variables, one- and three-year growth 2007(10)-2023.

Obs = 4,060	Population 1y	Population 3y	Employment 1y	Employment 3y	Productivity 1y	Productivity 3y	Av. wage 1y	Av. wage 3y
Population 1y	1.0000							
Population 3y	0.8628	1.0000						
Employment 1y	0.2740	0.2556	1.0000					
Employment 3y	0.3594	0.4430	0.4595	1.0000				
Productivity 1y	0.0515	0.0088	-0.0566	-0.0697	1.0000			
Productivity 3y	0.0846	0.0639	-0.0416	-0.0170	0.4649	1.0000		
Average wage 1y	0.1664	0.1225	-0.1700	0.1291	0.1352	0.1457	1.0000	
Average wage 3y	0.2992	0.2331	-0.0453	0.0416	0.1280	0.1983	0.6217	1.0000

Notes: Observations refer to year-municipality.

Table B2. Correlation matrix for outcome variables, one-, three-, and five-year growth 2007(12)-2023.

Obs = 3,480	Pop. 1y	Pop. 3y	Pop. 5y	Emp. 1y	Emp. 3y	Emp. 5y	Prod. 1y	Prod. 3y	Prod. 5y	Av. wage 1y	Av. wage 3y	Av. wage 5y
Pop. 1y	1.0000											
Pop. 3y	0.8530	1.0000										
Pop. 5y	0.7617	0.9423	1.0000									
Emp. 1y	0.3582	0.3515	0.3156	1.0000								
Emp. 3y	0.3338	0.4226	0.4128	0.5827	1.0000							
Emp. 5y	0.4347	0.5317	0.5638	0.4697	0.7033	1.0000						
Prod. 1y	0.0673	0.0214	0.0067	-0.0569	-0.0460	-0.0061	1.0000					
Prod. 3y	0.0675	0.0418	0.0061	0.0128	-0.0561	-0.0426	0.4935	1.0000				
Prod. 5y	0.1143	0.1117	0.0911	0.0424	-0.0224	0.0305	0.4313	0.6086	1.0000			
Av. wage 1y	0.1603	0.0988	0.0411	-0.1492	0.0679	0.1051	0.1698	0.1400	0.1258	1.0000		
Av. wage 3y	0.3106	0.2322	0.1593	-0.0039	0.0182	0.2036	0.1223	0.1864	0.2031	0.6647	1.0000	
Av. wage 5y	0.3022	0.2858	0.2333	0.0469	0.0844	0.1982	0.1016	0.1693	0.2339	0.5844	0.8211	1.0000

Notes: Observations refer to year-municipality.

Appendix C – Descriptive statistics for control variables

Table C1. Descriptive statistics for control variables averaged over 2007-2022 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
Urban					
LQ tourism	608	0.9429	0.3467	0.2740	2.621
LQ mining	608	0.1429	0.2045	0	1.695
LQ manufacturing	608	0.7477	0.4870	0.1080	3.761
Highly educated	608	0.3075	0.1014	0.1404	0.6024
Aged 15-29	608	0.1959	0.0271	0.1268	0.2787
Aged 65+	608	0.1674	0.0215	0.1161	0.2118
Population density	608	855.4	1,235	48.25	6,229
Capital intensity	608	513,459	231,977	126,610	1,576,300
Employment rate	608	0.7784	0.0453	0.6080	0.8700
Micropolitan					
LQ tourism	1,552	0.8306	0.2851	0.1561	2.040
LQ mining	1,552	2.624	14.57	0	128.2
LQ manufacturing	1,552	1.365	0.8036	0.2423	4.638
Highly educated	1,552	0.1970	0.0547	0.0768	0.3822
Aged 15-29	1,552	0.1721	0.0159	0.1224	0.2268
Aged 65+	1,552	0.2148	0.0308	0.1149	0.2990
Population density	1,552	67.39	63.78	1.110	346.9
Capital intensity	1,552	527,627	282,945	181,128	2,263,152
Employment rate	1,552	0.7994	0.0368	0.6430	0.8870
Rural					
LQ tourism	2,480	0.8753	0.6790	0.0626	7.111
LQ mining	2,480	1.503	5.486	0	59.59
LQ manufacturing	2,480	1.653	0.9171	0.0612	5.613
Highly educated	2,480	0.1459	0.0409	0.0745	0.3972
Aged 15-29	2,480	0.1594	0.0131	0.1101	0.1991
Aged 65+	2,480	0.2479	0.0375	0.1031	0.3836
Population density	2,480	23.82	44.39	0.2124	502.7
Capital intensity	2,480	524,101	271,245	159,113	2,834,435
Employment rate	2,480	0.7928	0.0418	0.6000	0.8950

Notes: Capital intensity is measured in real 2020 terms, adjusted for inflation using the national CPIF. As the control variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

Table C2. Descriptive statistics for control variables averaged over 2007-2022 per close and remote non-urban regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
Micropolitan close					
LQ tourism	1,136	0.8290	0.2935	0.1561	2.040
LQ mining	1,136	0.3035	0.5116	0	3.784
LQ manufacturing	1,136	1.317	0.8083	0.2423	4.638
Highly educated	1,136	0.2035	0.0580	0.0768	0.3822
Aged 15-29	1,136	0.1713	0.0165	0.1224	0.2268
Aged 65+	1,136	0.2093	0.0313	0.1149	0.2824
Population density	1,136	80.55	68.90	6.828	346.9
Capital intensity	1,136	495,981	196,512	181,128	1,328,871
Employment rate	1,136	0.8011	0.0380	0.6430	0.8870
Micropolitan remote					
LQ tourism	416	0.8352	0.2613	0.3349	1.894
LQ mining	416	8.960	27.16	0	128.2
LQ manufacturing	416	1.497	0.7765	0.4130	3.801
Highly educated	416	0.1794	0.0394	0.0951	0.3178
Aged 15-29	416	0.1744	0.0140	0.1397	0.2224
Aged 65+	416	0.2300	0.0237	0.1696	0.2990
Population density	416	31.46	21.34	1.110	85.31
Capital intensity	416	614,045	428,208	234,049	2,263,152
Employment rate	416	0.7946	0.0331	0.7040	0.8840
Rural close					
LQ tourism	1,344	0.7660	0.5386	0.0626	3.912
LQ mining	1,344	1.807	6.7253	0	59.59
LQ manufacturing	1,344	1.783	0.8987	0.2290	4.495
Highly educated	1,344	0.1521	0.0467	0.0757	0.3972
Aged 15-29	1,344	0.1596	0.0128	0.1101	0.1914
Aged 65+	1,344	0.2365	0.0373	0.1031	0.3802
Population density	1,344	24.64	24.59	1.815	209
Capital intensity	1,344	529,757	256,113	159,113	2,094,127
Employment rate	1,344	0.7997	0.0376	0.6780	0.8950
Rural remote					
LQ tourism	1,136	1.005	0.7956	0.1227	7.111
LQ mining	1,136	1.143	3.4607	0	39.36
LQ manufacturing	1,136	1.499	0.9152	0.0612	5.613
Highly educated	1,136	0.1386	0.0311	0.0745	0.2631
Aged 15-29	1,136	0.1593	0.0134	0.1189	0.1991
Aged 65+	1,136	0.2614	0.0330	0.1575	0.3836
Population density	1,136	22.85	59.88	0.2124	502.7
Capital intensity	1,136	517,408	288,093	165,173	2,834,435
Employment rate	1,136	0.7845	0.0449	0.6000	0.8730

Notes: Capital intensity is measured in real 2020 terms, adjusted for inflation using the national CPIF. As the control variables are lagged one year in the empirical estimations, 2023 is not included in the averaged values. Observations refer to year-municipality.

Table C3. Correlation matrix for explanatory variables, 2007-2022.

Obs = 4,640	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Population	1															
2 Employment	0.9785	1														
3 Productivity	0.3202	0.3581	1													
4 Average wage	0.5719	0.6252	0.6187	1												
5 Entry rate	-0.3699	-0.3284	-0.0612	-0.3829	1											
6 Micro firms	-0.3469	-0.4485	-0.1767	-0.4688	0.4053	1										
7 Micro KIA firms	0.6866	0.6321	0.4262	0.5618	-0.1831	-0.0848	1									
8 LQ tourism	0.0750	0.0836	0.1147	-0.0599	0.2862	0.0817	0.2132	1								
9 LQ mining	-0.0334	-0.0060	0.2812	0.1138	0.0275	-0.1413	-0.0501	0.0455	1							
10 LQ manu	-0.3166	-0.2544	-0.0102	0.1039	-0.2430	-0.1286	-0.4287	-0.3633	-0.0867	1						
11 Highly edu	0.6423	0.6038	0.3703	0.5256	-0.0776	-0.0264	0.8871	0.1497	-0.0651	-0.4575	1					
12 Aged 15-29	0.6344	0.6746	0.1320	0.3916	-0.3826	-0.5231	0.3522	0.0064	-0.0060	-0.1637	0.3242	1				
13 Aged 65+	-0.6201	-0.5571	-0.2025	-0.3195	0.4566	0.1858	-0.5759	-0.0124	0.0420	0.2427	-0.4875	-0.6134	1			
14 Pop. density	0.3876	0.3984	0.3132	0.4468	-0.0367	-0.0470	0.5683	0.0496	-0.0446	-0.2165	0.4816	0.2627	-0.3574	1		
15 Cap. intensity	0.0189	0.0679	0.4843	0.2971	0.0295	-0.1365	-0.0151	0.0802	0.4552	0.0553	-0.0179	-0.0112	0.0924	0.1104	1	
16 Emp. rate	-0.0735	-0.1010	0.1418	-0.0279	0.1698	0.3113	0.1075	0.0244	0.1130	-0.0979	0.2221	-0.3455	-0.0381	-0.0433	0.0916	1

Notes: Population, employment, productivity, average wage, population density, and capital intensity are in logarithmic form. Observations refer to year-municipality.

Appendix D – Panel descriptive statistics

Variable		Mean	Std. dev.	Min	Max	Obs
Population growth	overall	0.0035	0.0101	-0.0326	0.0482	N = 4,640
	between		0.0072	-0.0154	0.0291	n = 290
	within		0.0071	-0.0259	0.0532	T = 16
Employment growth	overall	0.0045	0.0263	-0.1611	0.1423	N = 4,640
	between		0.0081	-0.0195	0.0389	n = 290
	within		0.0250	-0.1653	0.1109	T = 16
Productivity growth	overall	0.0060	0.0901	-0.8854	0.9685	N = 4,640
	between		0.0086	-0.0352	0.0436	n = 290
	within		0.0897	-0.8891	0.9642	T = 16
Average wage growth	overall	0.0067	0.0215	-0.1386	0.1407	N = 4,640
	between		0.0028	-0.0026	0.0157	n = 290
	within		0.0213	-0.1293	0.1367	T = 16
Population (ln)	overall	9.847	0.9613	7.772	13.80	N = 4,640
	between		0.9620	7.802	13.72	n = 290
	within		0.0405	9.606	10.04	T = 16
Employment (ln)	overall	8.936	1.048	6.592	13.52	N = 4,640
	between		1.048	6.695	13.38	n = 290
	within		0.0532	8.704	9.274	T = 16
Productivity (ln)	overall	13.58	0.2077	12.75	14.98	N = 4,640
	between		0.1846	13.26	14.60	n = 290
	within		0.0958	12.80	14.53	T = 16
Average wage (ln)	overall	12.63	0.1167	12.26	13.21	N = 4,640
	between		0.1043	12.34	13.10	n = 290
	within		0.0527	12.46	12.83	T = 16
Entry rate	overall	0.0172	0.0058	0.0059	0.0846	N = 4,640
	between		0.0049	0.0092	0.0328	n = 290
	within		0.0032	0.0027	0.0759	T = 16
Micro firms	overall	0.8161	0.0501	0.6520	0.9237	N = 4,640
	between		0.0477	0.6968	0.9144	n = 290
	within		0.0155	0.7396	0.8731	T = 16
Micro KIA firms	overall	0.1964	0.0950	0.0348	0.6113	N = 4,640
	between		0.0939	0.0520	0.5914	n = 290
	within		0.0156	0.1247	0.2726	T = 16
LQ tourism	overall	0.8692	0.5390	0.0626	7.111	N = 4,640
	between		0.5176	0.1261	5.432	n = 290
	within		0.1532	-1.425	2.548	T = 16
LQ mining	overall	1.700	9.3635	0.0000	128.2	N = 4,640
	between		9.2511	0.0000	111.0	n = 290
	within		1.5391	-11.2775	36.45	T = 16
LQ manufacturing	overall	1.438	0.8862	0.0612	5.614	N = 4,640
	between		0.8723	0.0904	4.669	n = 290
	within		0.1639	0.1678	2.582	T = 16
Highly educated	overall	0.1842	0.0779	0.0745	0.6024	N = 4,640
	between		0.0753	0.0939	0.5602	n = 290
	within		0.0203	0.0965	0.2644	T = 16
Aged 15-29	overall	0.1685	0.0205	0.1101	0.2787	N = 4,640
	between		0.0190	0.1323	0.2664	n = 290
	within		0.0076	0.1348	0.1941	T = 16

Aged 65+	overall	0.2263	0.0434	0.1031	0.3836	N = 4,640
	between		0.0404	0.1280	0.3259	n = 290
	within		0.0159	0.1624	0.3013	T = 16
Population density (ln)	overall	3.365	1.679	-1.549	8.737	N = 4,640
	between		1.681	-1.875	8.545	n = 290
	within		0.0405	3.124	3.561	T = 16
Capital intensity (ln)	overall	13.08	0.4058	11.75	14.86	N = 4,640
	between		0.3512	12.21	14.41	n = 290
	within		0.2042	11.63	14.56	T = 16
Employment rate	overall	0.7931	0.0412	0.6000	0.8950	N = 4,640
	between		0.0371	0.6596	0.8764	n = 290
	within		0.0181	0.7211	0.9383	T = 16

Appendix E – Estimations for three- and five-year growth

Table E1. Relationship between entrepreneurship and three-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. All regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0020	0.0027	-0.2656***	-0.0592***	-0.0668***	-0.6166***	-0.9431***	-0.6789***
	(0.0016)	(0.0020)	(0.0418)	(0.0154)	(0.0250)	(0.0372)	(0.0322)	(0.0311)
Entry rate	-0.1418	-0.3559	3.6887***	0.3657**	-0.1280	-0.0564	0.7226	0.3156*
	(0.1677)	(0.2846)	(0.7186)	(0.1603)	(0.1021)	(0.2610)	(0.6604)	(0.1868)
Micro firms	0.0607***	0.1008***	-0.1483*	-0.0218	0.0286	-0.0386	-0.3793*	-0.0456
	(0.0164)	(0.0342)	(0.0823)	(0.0198)	(0.0397)	(0.1005)	(0.2144)	(0.0573)
LQ tourism	0.0060***	0.0036**	0.0010	0.0025**	-0.0024	0.0018	-0.0134	-0.0072*
	(0.0011)	(0.0018)	(0.0064)	(0.0011)	(0.0037)	(0.0063)	(0.0133)	(0.0040)
LQ mining	-0.0001**	0.0001	0.0021***	0.0003***	-0.0002	-0.0016**	0.0047**	-0.0000
	(0.0000)	(0.0001)	(0.0005)	(0.0000)	(0.0002)	(0.0007)	(0.0019)	(0.0004)
LQ manu-facturing	-0.0004	-0.0036**	0.0150***	0.0010	0.0016	0.0069	0.0101	0.0067*
	(0.0009)	(0.0016)	(0.0044)	(0.0009)	(0.0022)	(0.0078)	(0.0136)	(0.0040)
Highly educated	-0.0217	0.0451	0.1224**	0.0247*	0.1726*	0.5191**	0.0124	0.3329***
	(0.0180)	(0.0288)	(0.0510)	(0.0129)	(0.0949)	(0.2060)	(0.5062)	(0.1237)
Age 15-29	0.0947*	0.0348	0.1716	0.0232	-0.2983***	-0.1731	-0.3885	0.1897
	(0.0509)	(0.1000)	(0.1727)	(0.0402)	(0.0954)	(0.2097)	(0.4731)	(0.1383)
Age 65+	-0.1678***	-0.2267***	-0.1535	-0.0160	0.3440***	-0.1438	0.0038	0.3911***
	(0.0307)	(0.0477)	(0.1170)	(0.0245)	(0.0791)	(0.1571)	(0.3376)	(0.0959)
Population density (ln)	0.0049***	0.0001	0.0094*	0.0029***		0.4355***	-0.1592	0.0312
	(0.0009)	(0.0013)	(0.0050)	(0.0008)		(0.0586)	(0.1191)	(0.0295)
Capital intensity (ln)	0.0015	-0.0006	0.0493***	0.0032**	-0.0004	0.0049	-0.0020	0.0016
	(0.0014)	(0.0025)	(0.0090)	(0.0014)	(0.0019)	(0.0053)	(0.0111)	(0.0027)
Employment rate	0.0925***	-0.0115	0.1374**	0.0495**	0.0123	-0.0154	-0.2117	0.0739
	(0.0171)	(0.0310)	(0.0643)	(0.0198)	(0.0359)	(0.0949)	(0.2424)	(0.0527)
Region type								
Micropolitan close	-0.0020	-0.0037	-0.0064	0.0017				
	(0.0030)	(0.0054)	(0.0093)	(0.0020)				
Micropolitan remote	-0.0080**	-0.0082	-0.0021	0.0013				
	(0.0032)	(0.0058)	(0.0114)	(0.0023)				
Rural close	-0.0043	-0.0056	-0.0224	-0.0017				
	(0.0045)	(0.0073)	(0.0143)	(0.0029)				
Rural remote	-0.0112**	-0.0068	-0.0119	0.0009				
	(0.0046)	(0.0078)	(0.0134)	(0.0030)				
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.6594	0.3417	0.1913	0.5953	0.4281	0.5038	0.5164	0.7374
F-stat	74.80***	75.44***	18.20***	225.6***	43.39***	150.4***	103.3***	308.9***
N	4,060	4,060	4,060	4,060	4,060	4,060	4,060	4,060
n					290	290	290	290

Notes: Population density is omitted in specification FE (i) due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged three years. Base category for region type is urban.

Table E2. Relationship between entrepreneurship and five-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. All regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0029	0.0046	-0.3386***	-0.0685***	-0.1667***	-0.9397***	-1.0685***	-0.8687***
	(0.0027)	(0.0034)	(0.0469)	(0.0254)	(0.0416)	(0.0452)	(0.0276)	(0.0398)
Entry rate	-0.4261	-0.6978	5.1249***	0.4315**	-0.3080**	-0.4653	0.7739	-0.0045
	(0.3129)	(0.4649)	(1.0409)	(0.2096)	(0.1553)	(0.3679)	(0.7781)	(0.1929)
Micro firms	0.0960***	0.1676***	-0.1465	-0.0039	-0.0380	-0.1141	-0.2247	-0.0121
	(0.0271)	(0.0570)	(0.1087)	(0.0323)	(0.0573)	(0.1171)	(0.2312)	(0.0610)
LQ tourism	0.0099***	0.0037	0.0016	0.0047***	-0.0086	-0.0037	-0.0048	-0.0118*
	(0.0020)	(0.0028)	(0.0086)	(0.0017)	(0.0062)	(0.0097)	(0.0185)	(0.0061)
LQ mining	-0.0001**	0.0001	0.0026***	0.0004***	-0.0002	-0.0010	0.0022	-0.0007
	(0.0001)	(0.0002)	(0.0005)	(0.0001)	(0.0002)	(0.0007)	(0.0026)	(0.0006)
LQ manu-facturing	-0.0006	-0.0059**	0.0207***	0.0002	0.0017	0.0185**	-0.0023	-0.0041
	(0.0015)	(0.0027)	(0.0059)	(0.0015)	(0.0036)	(0.0092)	(0.0142)	(0.0055)
Highly educated	-0.0380	0.0705	0.1476**	0.0331	0.3864**	0.8846***	-0.1971	0.3783**
	(0.0300)	(0.0483)	(0.0733)	(0.0207)	(0.1547)	(0.2854)	(0.5227)	(0.1604)
Age 15-29	0.1678*	0.1336	0.5197**	-0.0021	-0.6777***	-0.4845	-0.0619	0.1243
	(0.0865)	(0.1694)	(0.2368)	(0.0599)	(0.1507)	(0.3000)	(0.5865)	(0.1615)
Age 65+	-0.2778***	-0.3502***	-0.1643	-0.0459	0.5846***	-0.0409	-0.1268	0.5431***
	(0.0535)	(0.0815)	(0.1624)	(0.0370)	(0.1297)	(0.2350)	(0.3424)	(0.1318)
Population density (ln)	0.0083***	0.0007	0.0141**	0.0038***		0.6134***	-0.3088**	0.0286
	(0.0015)	(0.0022)	(0.0063)	(0.0012)		(0.0869)	(0.1318)	(0.0411)
Capital intensity (ln)	0.0021	-0.0005	0.0548***	0.0040*	-0.0022	0.0059	0.0115	0.0033
	(0.0024)	(0.0040)	(0.0104)	(0.0023)	(0.0026)	(0.0063)	(0.0113)	(0.0031)
Employment rate	0.1463***	-0.0046	0.2013**	0.0609**	0.0406	0.1285	0.1214	0.0595
	(0.0289)	(0.0524)	(0.0899)	(0.0283)	(0.0573)	(0.1221)	(0.2520)	(0.0624)
Region type								
Micropolitan close	-0.0038	-0.0051	-0.0065	0.0039				
	(0.0049)	(0.0089)	(0.0130)	(0.0032)				
Micropolitan remote	-0.0137**	-0.0141	0.0007	0.0041				
	(0.0054)	(0.0093)	(0.0157)	(0.0036)				
Rural close	-0.0066	-0.0073	-0.0253	-0.0007				
	(0.0075)	(0.0121)	(0.0192)	(0.0046)				
Rural remote	-0.0184**	-0.0087	-0.0129	0.0044				
	(0.0077)	(0.0128)	(0.0184)	(0.0046)				
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.7041	0.3217	0.2570	0.6468	0.5084	0.5319	0.6069	0.8206
F-stat	79.64***	61.83***	17.88***	232.1***	45.95***	124.9***	128.9***	464.4***
N	4,640	4,640	4,640	4,640	4,640	4,640	4,640	4,640
n					290	290	290	290

Notes: Population density is omitted in specification (i) FE due to collinearity with the lagged dependent variable, Y. R-squared refers to within in FE estimations. Cluster-robust standard errors in parenthesis. All explanatory variables are lagged five years. Base category for region type is urban.

Table E3. Relationship between entrepreneurship and three-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Micropolitan regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0018	0.0058	-0.3710***	-0.0285	-0.0333	-0.6434***	-0.9662***	-0.6068***
	(0.0023)	(0.0039)	(0.0710)	(0.0346)	(0.0408)	(0.0677)	(0.0477)	(0.0647)
Entry rate	-0.2609	-1.5690**	0.8485	0.1209	-0.6643***	-1.3504**	-2.5890	-0.0042
	(0.2979)	(0.7103)	(1.6041)	(0.3870)	(0.2426)	(0.6103)	(1.7155)	(0.4276)
Micro firms	0.1089***	0.1502***	-0.0109	0.0065	0.0671	-0.0616	-0.0123	-0.0458
	(0.0229)	(0.0477)	(0.1259)	(0.0347)	(0.0602)	(0.1601)	(0.3279)	(0.0816)
LQ tourism	0.0071***	0.0153**	0.0325	0.0043	-0.0033	-0.0020	0.0422	0.0030
	(0.0022)	(0.0059)	(0.0214)	(0.0027)	(0.0050)	(0.0146)	(0.0392)	(0.0068)
LQ mining	-0.0000	0.0000	0.0027***	0.0002***	0.0001	-0.0014***	0.0126***	0.0028***
	(0.0001)	(0.0001)	(0.0005)	(0.0001)	(0.0004)	(0.0005)	(0.0025)	(0.0005)
LQ manu-facturing	0.0003	-0.0048*	0.0313***	0.0007	0.0020	-0.0156	0.0030	0.0096
	(0.0012)	(0.0025)	(0.0087)	(0.0018)	(0.0044)	(0.0164)	(0.0256)	(0.0067)
Highly educated	0.0145	0.0294	0.2802**	0.0338	0.1742*	0.5969**	0.7550	0.4538*
	(0.0196)	(0.0377)	(0.1199)	(0.0280)	(0.0956)	(0.2654)	(1.0977)	(0.2329)
Age 15-29	0.2581***	0.0659	-0.1873	-0.0139	-0.3325**	-0.5953	0.5788	0.0126
	(0.0692)	(0.1706)	(0.3202)	(0.0655)	(0.1378)	(0.3796)	(0.8908)	(0.2224)
Age 65+	-0.0069	-0.1433**	-0.4503*	-0.0355	0.5668***	0.2341	-0.5304	0.8275***
	(0.0306)	(0.0655)	(0.2269)	(0.0332)	(0.1262)	(0.2641)	(0.9351)	(0.1947)
Population density (ln)	0.0062***	0.0013	-0.0057	0.0013		0.3841***	-0.4362*	0.1849***
	(0.0010)	(0.0020)	(0.0087)	(0.0014)		(0.0954)	(0.2410)	(0.0573)
Capital intensity (ln)	0.0015	-0.0016	0.0414***	-0.0010	-0.0013	0.0104	-0.0073	0.0099
	(0.0021)	(0.0039)	(0.0157)	(0.0025)	(0.0037)	(0.0094)	(0.0297)	(0.0071)
Employment rate	0.1221***	0.0920*	0.0337	0.0735**	-0.0770	0.0251	-1.0301**	-0.1511
	(0.0220)	(0.0508)	(0.1383)	(0.0286)	(0.0586)	(0.1607)	(0.5065)	(0.0977)
Remote	-0.0066***	-0.0027	-0.0011	0.0006				
	(0.0016)	(0.0027)	(0.0094)	(0.0015)				
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.5997	0.3932	0.2426	0.7077	0.4259	0.5831	0.5393	0.8135
F-stat	120.4***	47.79***	14.88***	179.1***	24.54***	104.2***	55.66***	224.1***
N	1,358	1,358	1,358	1,358	1,358	1,358	1,358	1,358
n					97	97	97	97

Table E4. Relationship between entrepreneurship and five-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Micropolitan regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0021	0.0099	-0.4649***	-0.0189	-0.1619**	-0.9558***	-1.0953***	-0.7780***
	(0.0037)	(0.0062)	(0.0931)	(0.0609)	(0.0755)	(0.0866)	(0.0607)	(0.0828)
Entry rate	-0.5427	-1.7878	2.0745	0.3725	-0.9997***	-0.8942	-0.3414	-0.0527
	(0.5048)	(1.1034)	(2.3221)	(0.6555)	(0.3571)	(0.6669)	(2.3403)	(0.4758)
Micro firms	0.1694***	0.2213***	0.0178	0.0134	-0.0726	-0.1118	0.0217	-0.0811
	(0.0378)	(0.0770)	(0.1759)	(0.0604)	(0.0894)	(0.1706)	(0.5088)	(0.1016)
LQ tourism	0.0122***	0.0225**	0.0400	0.0072	-0.0078	-0.0103	0.0229	0.0005
	(0.0038)	(0.0094)	(0.0267)	(0.0052)	(0.0092)	(0.0203)	(0.0264)	(0.0104)
LQ mining	-0.0001	0.0000	0.0033***	0.0004**	-0.0001	-0.0023***	0.0138***	0.0037***
	(0.0001)	(0.0002)	(0.0007)	(0.0001)	(0.0005)	(0.0008)	(0.0024)	(0.0008)
LQ manu-facturing	0.0004	-0.0064*	0.0425***	-0.0001	0.0034	-0.0117	0.0012	-0.0028
	(0.0019)	(0.0038)	(0.0117)	(0.0032)	(0.0062)	(0.0139)	(0.0311)	(0.0073)
Highly educated	0.0231	0.0475	0.3681**	0.0237	0.4023**	0.9063**	0.7329	0.6782**
	(0.0331)	(0.0585)	(0.1612)	(0.0488)	(0.1793)	(0.3591)	(1.1822)	(0.3035)
Age 15-29	0.4405***	0.1799	0.3074	-0.0298	-0.7062***	-1.0837*	1.4596	0.0979
	(0.1149)	(0.2724)	(0.3944)	(0.1072)	(0.2105)	(0.5594)	(0.9160)	(0.2668)
Age 65+	0.0069	-0.2190**	-0.3840	-0.0592	0.9304***	0.6488*	-0.7429	1.0498***
	(0.0516)	(0.0974)	(0.2882)	(0.0600)	(0.2025)	(0.3896)	(0.9366)	(0.2660)
Population density (ln)	0.0102***	0.0032	-0.0034	0.0031		0.5248***	-0.6116**	0.2052**
	(0.0017)	(0.0030)	(0.0119)	(0.0022)		(0.1354)	(0.2728)	(0.0813)
Capital intensity (ln)	0.0015	-0.0028	0.0491***	-0.0046	-0.0059	0.0107	-0.0100	0.0088
	(0.0034)	(0.0060)	(0.0181)	(0.0041)	(0.0055)	(0.0113)	(0.0288)	(0.0067)
Employment rate	0.2173***	0.1500*	0.2117	0.1429***	-0.0589	0.1011	-0.2621	-0.1655
	(0.0367)	(0.0799)	(0.1671)	(0.0453)	(0.0881)	(0.1855)	(0.3953)	(0.1116)
Remote	-0.0114***	-0.0066	-0.0018	0.0017				
	(0.0026)	(0.0042)	(0.0123)	(0.0024)				
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.6491	0.3569	0.3187	0.7487	0.5089	0.6163	0.6392	0.8796
F-stat	112***	37.85***	19.40***	204.9***	31.04***	96.17***	105.2***	325.9***
N	1,164	1,164	1,164	1,164	1,164	1,164	1,164	1,164
n					97	97	97	97

Table E5. Relationship between entrepreneurship and three-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Urban regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	-0.0061**	0.0061*	-0.2473***	-0.0811**	-0.0253	-0.3388**	-0.9004***	-0.6965***
	(0.0025)	(0.0034)	(0.0734)	(0.0338)	(0.0531)	(0.1270)	(0.0873)	(0.1065)
Entry rate	0.0018	0.2398	4.5637*	0.2336	-0.1275	0.0971	3.1045	-1.1177
	(0.9124)	(1.4088)	(2.2788)	(0.6197)	(0.8118)	(2.1263)	(2.7667)	(0.9441)
Micro firms	-0.0230	-0.0356	-0.1655	-0.0216	-0.3005**	0.1353	-1.0782	-0.0996
	(0.0493)	(0.0801)	(0.1737)	(0.0400)	(0.1337)	(0.3646)	(0.6970)	(0.1622)
LQ tourism	0.0048	-0.0358***	-0.0007	-0.0048	-0.0259*	-0.0519	0.0400	0.0376**
	(0.0043)	(0.0069)	(0.0181)	(0.0039)	(0.0130)	(0.0321)	(0.0419)	(0.0165)
LQ mining	-0.0141**	-0.0066	-0.0242	0.0036	-0.0100**	-0.0008	-0.0119	0.0005
	(0.0056)	(0.0128)	(0.0169)	(0.0060)	(0.0047)	(0.0145)	(0.0188)	(0.0056)
LQ manu-facturing	0.0017	-0.0049	0.0585***	0.0030	0.0128	0.0214	0.0767	0.0189*
	(0.0034)	(0.0049)	(0.0205)	(0.0031)	(0.0090)	(0.0209)	(0.0535)	(0.0100)
Highly educated	-0.0283	0.0279	0.1491**	0.0297	-0.2217	0.3831	0.2952	0.5060***
	(0.0282)	(0.0499)	(0.0735)	(0.0198)	(0.1885)	(0.5639)	(0.7137)	(0.1646)
Age 15-29	0.1415	-0.3064	0.5415	0.1214	-0.1893	-0.8972	-2.5770**	-0.0317
	(0.1536)	(0.2374)	(0.3637)	(0.0976)	(0.2566)	(0.6051)	(0.9662)	(0.3643)
Age 65+	-0.2951**	-0.4676*	-0.4740	-0.0429	0.5670***	-0.5488	0.5798	0.0442
	(0.1256)	(0.2446)	(0.3557)	(0.1159)	(0.2044)	(0.7694)	(1.0037)	(0.2692)
Population density (ln)	0.0036	-0.0049	0.0105	0.0042**		0.1370	-0.3369	-0.0487
	(0.0027)	(0.0040)	(0.0070)	(0.0019)		(0.2138)	(0.2717)	(0.0683)
Capital intensity (ln)	0.0031	0.0162***	0.0165	0.0026	0.0008	0.0141	0.0094	-0.0036
	(0.0042)	(0.0048)	(0.0141)	(0.0041)	(0.0031)	(0.0104)	(0.0133)	(0.0039)
Employment rate	0.0504	-0.0062	0.2001	0.0474	0.0635	0.3148	-0.7029	-0.0143
	(0.0415)	(0.0836)	(0.1560)	(0.0323)	(0.1328)	(0.3568)	(0.5349)	(0.2063)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.4015	0.2478	0.2951	0.6789	0.4280	0.3281	0.6095	0.8086
F-stat	27.09***	110.6***	34.59***	121.7***	24.62***	48.09***	50.67***	276.6***
N	532	532	532	532	532	532	532	532
n					38	38	38	38

Table E6. Relationship between entrepreneurship and five-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Urban regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	-0.0105**	0.0088	-0.3115***	-0.1130**	-0.1183	-0.5220***	-1.0648***	-0.8614***
	(0.0043)	(0.0064)	(0.0902)	(0.0529)	(0.0822)	(0.1508)	(0.0906)	(0.0965)
Entry rate	-0.2393	0.6424	5.6314	1.1895	-0.5215	0.0427	6.8097*	-1.0776
	(1.6316)	(2.2192)	(4.0452)	(0.9739)	(1.0770)	(2.2075)	(3.5644)	(0.8046)
Micro firms	-0.0336	-0.0869	-0.1182	-0.0266	-0.2880	0.2658	-0.2756	-0.0014
	(0.0921)	(0.1590)	(0.2329)	(0.0564)	(0.2030)	(0.5536)	(0.8536)	(0.1852)
LQ tourism	0.0090	-0.0551***	-0.0010	-0.0123*	-0.0557***	-0.0991	0.0476	0.0417*
	(0.0070)	(0.0127)	(0.0271)	(0.0061)	(0.0183)	(0.0606)	(0.0560)	(0.0227)
LQ mining	-0.0223**	-0.0131	-0.0208	0.0059	-0.0088	0.0057	0.0305	-0.0006
	(0.0088)	(0.0197)	(0.0273)	(0.0092)	(0.0061)	(0.0236)	(0.0323)	(0.0056)
LQ manu-facturing	0.0040	-0.0065	0.0863***	0.0014	0.0221	0.0452	0.0748	0.0083
	(0.0060)	(0.0089)	(0.0281)	(0.0050)	(0.0153)	(0.0443)	(0.0549)	(0.0184)
Highly educated	-0.0490	0.0296	0.2061*	0.0237	-0.1190	0.7643	0.0200	0.5601**
	(0.0478)	(0.0827)	(0.1156)	(0.0336)	(0.2977)	(0.7612)	(0.7426)	(0.2397)
Age 15-29	0.2692	-0.3370	1.0026*	0.1479	-0.7861**	-1.3979*	-1.4619	0.3866
	(0.2526)	(0.4198)	(0.5519)	(0.1674)	(0.3803)	(0.7878)	(1.0298)	(0.4040)
Age 65+	-0.4303*	-0.6395	-0.4440	-0.0902	1.1050***	-0.5013	0.4791	0.0686
	(0.2152)	(0.4119)	(0.5134)	(0.1862)	(0.2967)	(1.0855)	(0.9484)	(0.3593)
Population density (ln)	0.0072	-0.0059	0.0167	0.0051*		0.0968	-0.5414*	-0.0439
	(0.0045)	(0.0070)	(0.0100)	(0.0028)		(0.3291)	(0.2935)	(0.0963)
Capital intensity (ln)	0.0048	0.0257***	0.0159	0.0074	-0.0001	0.0247**	0.0229	0.0086
	(0.0078)	(0.0076)	(0.0189)	(0.0072)	(0.0034)	(0.0095)	(0.0175)	(0.0067)
Employment rate	0.0894	0.0012	0.3283	0.0588	-0.0598	0.4051	0.2016	0.1730
	(0.0701)	(0.1390)	(0.2182)	(0.0505)	(0.2333)	(0.5211)	(0.6354)	(0.1931)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.4027	0.2155	0.3454	0.7218	0.4963	0.3163	0.7138	0.8641
F-stat	23.68***	111.7***	31.97***	171.9***	18.54***	47.36***	94.22***	331.9***
N	456	456	456	456	456	456	456	456
n					38	38	38	38

Table E7. Relationship between entrepreneurship and three-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Rural regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0043**	-0.0006	-0.2572***	-0.0706***	-0.0899**	-0.6615***	-0.9600***	-0.7340***
	(0.0020)	(0.0034)	(0.0517)	(0.0194)	(0.0381)	(0.0477)	(0.0438)	(0.0401)
Entry rate	0.0693	-0.1294	4.3756***	0.5260**	-0.0981	0.2638	0.5082	0.3785*
	(0.1487)	(0.3125)	(1.0115)	(0.2249)	(0.1063)	(0.2913)	(0.7556)	(0.2153)
Micro firms	0.0337	0.1492***	-0.3729**	-0.0770**	0.0122	-0.0410	-0.3734	-0.0985
	(0.0210)	(0.0492)	(0.1439)	(0.0344)	(0.0511)	(0.1304)	(0.2698)	(0.0763)
LQ tourism	0.0049***	0.0036*	-0.0029	0.0033***	-0.0002	0.0032	-0.0236	-0.0090**
	(0.0011)	(0.0019)	(0.0061)	(0.0012)	(0.0040)	(0.0072)	(0.0161)	(0.0040)
LQ mining	0.0001	0.0003	0.0010	0.0002	-0.0002	-0.0015*	0.0020	-0.0004
	(0.0001)	(0.0004)	(0.0007)	(0.0001)	(0.0003)	(0.0008)	(0.0020)	(0.0002)
LQ manu-facturing	0.0006	-0.0006	0.0051	0.0003	0.0014	0.0184**	0.0089	0.0050
	(0.0012)	(0.0023)	(0.0047)	(0.0012)	(0.0028)	(0.0091)	(0.0162)	(0.0051)
Highly educated	0.0435	0.1356*	0.1060	-0.0078	0.4778***	0.4519*	-0.5318	0.0459
	(0.0521)	(0.0814)	(0.1848)	(0.0372)	(0.1438)	(0.2531)	(0.5572)	(0.1628)
Age 15-29	-0.0823	0.1633	0.1048	-0.0490	-0.2750**	0.2674	-0.2844	0.1645
	(0.0769)	(0.1902)	(0.3749)	(0.0916)	(0.1350)	(0.2582)	(0.6296)	(0.1949)
Age 65+	-0.2392***	-0.2063***	-0.1433	-0.0370	0.2325**	0.0210	0.3773	0.2351*
	(0.0344)	(0.0712)	(0.1617)	(0.0388)	(0.1032)	(0.1974)	(0.3960)	(0.1299)
Population density (ln)	0.0043***	-0.0001	0.0163**	0.0042***		0.4471***	-0.0038	0.0926**
	(0.0011)	(0.0018)	(0.0072)	(0.0010)		(0.0698)	(0.1463)	(0.0435)
Capital intensity (ln)	0.0003	-0.0020	0.0640***	0.0041**	0.0005	0.0007	-0.0008	0.0002
	(0.0018)	(0.0034)	(0.0126)	(0.0018)	(0.0026)	(0.0057)	(0.0135)	(0.0034)
Employment rate	0.0672**	-0.0808*	0.2174**	0.0552	0.0375	-0.0976	0.1165	0.1979***
	(0.0261)	(0.0474)	(0.0942)	(0.0337)	(0.0492)	(0.1304)	(0.2901)	(0.0681)
Remote	-0.0057***	-0.0008	0.0084					
	(0.0015)	(0.0033)	(0.0076)					
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.6200	0.2899	0.2040	0.5448	0.4962	0.5489	0.5243	0.7115
F-stat	48.66***	39.75***	14.46***	127.9***	34.26***	88.09***	93.23***	130.9***
N	2,170	2,170	2,170	2,170	2,170	2,170	2,170	2,170
n					155	155	155	155

Table E8. Relationship between entrepreneurship and five-year regional growth in i) population, ii) employment, iii) productivity and iv) average wage, 2007-2023. Rural regions.

	POLS (i)	POLS (ii)	POLS (iii)	POLS (iv)	FE (i)	FE (ii)	FE (iii)	FE (iv)
ln Y	0.0064*	-0.0016	-0.3263***	-0.0726**	-0.2028***	-0.9886***	-1.0748***	-0.9154***
	(0.0034)	(0.0055)	(0.0564)	(0.0308)	(0.0649)	(0.0563)	(0.0307)	(0.0474)
Entry rate	0.0190	-0.5475	6.3122***	0.6029**	-0.2688	-0.3364	0.5774	0.0129
	(0.2902)	(0.4563)	(1.3862)	(0.2900)	(0.1719)	(0.4108)	(0.8309)	(0.2252)
Micro firms	0.0568	0.2667***	-0.4323**	-0.0498	-0.0361	-0.1461	-0.2673	-0.0499
	(0.0368)	(0.0799)	(0.1700)	(0.0562)	(0.0731)	(0.1500)	(0.2738)	(0.0764)
LQ tourism	0.0079***	0.0042	-0.0024	0.0057***	-0.0055	-0.0006	-0.0137	-0.0133**
	(0.0020)	(0.0027)	(0.0084)	(0.0018)	(0.0071)	(0.0109)	(0.0236)	(0.0063)
LQ mining	0.0001	0.0007	0.0011	0.0003	-0.0002	-0.0007	-0.0005	-0.0009
	(0.0001)	(0.0005)	(0.0008)	(0.0002)	(0.0003)	(0.0008)	(0.0019)	(0.0006)
LQ manu-facturing	0.0013	-0.0007	0.0059	-0.0008	0.0017	0.0331***	-0.0094	-0.0055
	(0.0021)	(0.0039)	(0.0063)	(0.0019)	(0.0046)	(0.0111)	(0.0164)	(0.0071)
Highly educated	0.0591	0.2049*	-0.0266	-0.0043	0.7247***	0.7244**	-0.7402	-0.0593
	(0.0864)	(0.1212)	(0.2298)	(0.0597)	(0.2250)	(0.3566)	(0.5577)	(0.2205)
Age 15-29	-0.0958	0.3008	0.1789	-0.1198	-0.5385**	0.1316	-0.2551	0.0455
	(0.1348)	(0.3002)	(0.5243)	(0.1331)	(0.2114)	(0.3576)	(0.8243)	(0.2134)
Age 65+	-0.3977***	-0.3481***	-0.2803	-0.0765	0.4791***	0.1301	0.1365	0.4037**
	(0.0624)	(0.1186)	(0.2288)	(0.0550)	(0.1687)	(0.2810)	(0.3761)	(0.1670)
Population density (ln)	0.0075***	-0.0003	0.0243***	0.0051***		0.5944***	-0.0978	0.1004*
	(0.0020)	(0.0029)	(0.0088)	(0.0016)		(0.1059)	(0.1498)	(0.0581)
Capital intensity (ln)	0.0008	-0.0022	0.0700***	0.0053*	-0.0005	0.0005	0.0177	0.0003
	(0.0031)	(0.0055)	(0.0150)	(0.0028)	(0.0035)	(0.0071)	(0.0145)	(0.0036)
Employment rate	0.1020**	-0.1148	0.2996**	0.0526	0.0312	-0.0100	0.2529	0.1369*
	(0.0446)	(0.0770)	(0.1285)	(0.0463)	(0.0767)	(0.1600)	(0.3205)	(0.0795)
Remote	-0.0097***	0.0007	0.0101	0.0042*				
	(0.0027)	(0.0054)	(0.0095)	(0.0025)				
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	NO	NO	NO	YES	YES	YES	YES
R^2	0.6592	0.2166	0.2715	0.6031	0.5674	0.5940	0.6011	0.7991
F-stat	42.96***	31.22***	14.27***	115***	30.09***	83.16***	128.4***	243.3***
N	1,860	1,860	1,860	1,860	1,860	1,860	1,860	1,860
n					155	155	155	155