

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

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Abstract

This paper examines the role of entrepreneurship in regional growth, with a particular focus on micropolitan regions – municipalities located between metropolitan cores and rural peripheries. While much of the existing literature has concentrated on urban or rural contexts, intermediate regions remain comparatively understudied despite their importance within national spatial systems. Using longitudinal data for all 290 Swedish municipalities over 2007–2023 and dynamic panel models, we analyze how different forms of entrepreneurship relate to growth in population, employment, productivity, and wages. The results show that entrepreneurship matters for regional growth, but in ways that are strongly place-contingent. In micropolitan regions, a higher share of micro firms is consistently associated with population growth, but effects are largely confined to the extensive margin, with limited evidence of productivity or wage gains. Entry rates show weak or negative associations with longer-term growth, while knowledge-intensive entrepreneurship contributes to wage and population growth over longer horizons. Comparative results reveal substantial heterogeneity across the spatial hierarchy: in urban regions, micro firms are negatively associated with population, employment, and wage growth, while rural regions exhibit positive short-run employment effects from firm entry. The findings highlight the importance of distinguishing between types of entrepreneurship and accounting for regional context when analyzing growth implications.

Keywords: Micropolitan regions, Entrepreneurship, Regional growth, Spatial heterogeneity, Sweden

JEL codes: R11, L26, R12, O18

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1. Introduction

Research on regional growth has long centered on metropolitan areas, and for good reason: large cities concentrate population, infrastructure, innovation, and institutional capacity, making them engines of national economies (Florida, 2002; Florida et al., 2018; Glaeser, 2011; Glaeser et al., 1992). Agglomeration economies, dense labor markets, and high levels of human capital reinforce this metropolitan advantage (Rosenthal & Strange, 2004). However, this city-centric focus has overshadowed micropolitan regions – municipalities located between metropolitan cores and rural peripheries – whose developmental paths remain underexplored despite their critical role in national spatial systems (Dijkstra et al., 2013). Often treated as "in-between places", they are neither fully urban nor rural, yet frequently aggregated with one of these categories or overlooked entirely (Vias, 2012a). This is notable given that micropolitan regions account for approximately 33 percent of land area and 35 percent of the population in Sweden, while the corresponding figures in the US are 20 percent of land area and 8.3 percent of the population (United States Census Bureau, 2025). Only a limited number of studies examine the role of entrepreneurship in these regions (Bignall & Debbage, 2023; Liu et al., 2021).

The concept of micropolitan regions originates from the US, where micropolitan statistical areas are anchored by an urban cluster of 10,000 to 50,000 inhabitants. These areas differ markedly from rural areas in socioeconomic structure (Brown et al., 2004) and have varied industrial compositions that shape growth and vulnerability to economic change (Davidsson & Rickman, 2011; Mulligan & Vias, 2006; Vias et al., 2002). Despite this body of work, research on micropolitan growth remains limited (Vias, 2012b). Recent contributions highlight the role of micropolitan regions in bridging the urban-rural divide (Foster & Gillette, 2023) and facilitating broader regional integration (Roberts & Hohmann, 2014), but also their vulnerability to industrial restructuring and demographic aging. Regarding entrepreneurship specifically, Bignall and Debbage (2023) find that nonfarm proprietorship in US micropolitan counties is linked to construction and real estate employment, while Liu et al. (2021) find positive associations between entrepreneurship, natural amenities, and the middle-aged population share. McFarland and Grabowski (2022) underscore the importance of inter-regional connectivity. Evidence from outside the US remains scarce: Bjarnason et al. (2021) examine the role of micropolitan regions in Iceland in shaping urban-rural migration patterns, while Birkner et al. (2018) highlight competitiveness and innovation challenges in Hungarian micropolitan regions. In many countries, including Sweden, micropolitan regions have emerged around historical manufacturing hubs or regional administrative centers, and need to be studied in their own right rather than as scaled-down cities or enlarged rural towns (Dijkstra et al., 2013; Laurin et al., 2020; Roberts & Hohmann, 2014). In the Swedish context specifically, historical industry structures have been shown to shape the long-run entrepreneurial character of regions, with early heavy industry and political traditions generating persistent differences in new firm formation rates across municipalities (Andersson & Larsson, 2022).

Entrepreneurship has long been recognized as a driver of regional economic development, but its effects are neither uniform nor unconditional. A large body of research documents positive relationships between new firm formation, knowledge spillovers, and regional growth, particularly in urban and knowledge-intensive contexts (Audretsch & Fritsch, 2002; Stam & Wennberg, 2009), though the magnitude and dynamics of these effects vary systematically with city and region size (Audretsch et al., 2015). Additionally, the relationship between entrepreneurship and growth depends on the type of entrepreneurial activity, the quality of new entrants, and the regional environment in which it occurs (Fritsch & Wyrwich, 2017; Stam, 2010). Not all entrepreneurship is growth-oriented: in non-urban regions, a substantial share of firm formation reflects necessity-driven or lifestyle-oriented motivations rather than opportunity-seeking behavior, and such activities may support local employment without generating broader structural transformation (Amit & Muller, 1995). This distinction between extensive and intensive margins of growth – between expanding quantities and improving quality – is central to understanding how entrepreneurship contributes differently across the urban-rural spectrum.

Entrepreneurial activity is geographically uneven, depending strongly on regional contexts such as local knowledge bases, institutions, networks, and historical development paths (Stam, 2010). Micropolitan regions can develop entrepreneurial ecosystems when local networks and institutional support compensate for smaller size and thinner markets (Bond et al., 2026). Entrepreneurship may be of particular importance in such areas given limited traditional labor market opportunities (Duranton & Puga, 2004), while place-specific amenities create favorable conditions for locally embedded activities – for instance in tourism (Naldi et al., 2015, 2021). New business creation has been shown to remain an important generator of employment even in regions experiencing population decline (Delfmann & Koster, 2016). In non-urban regions, innovation is often more incremental and tied to local conditions (North & Smallbone, 2000), meaning entrepreneurial activity may support job creation without necessarily generating productivity gains, and the determinants and nature of entrepreneurial activity differ systematically between urban and rural contexts (Eliasson & Westlund, 2013). These processes are further shaped by accessibility: firms in more accessible regions benefit from stronger networks and institutional support, while those in more remote areas rely more on niche specialization and local adaptation (Greenberg et al., 2018; Keeble & Tyler, 1995; Vaessen & Keeble, 1995), and distance to urban centers has been shown to be a significant constraint on population and economic growth in hinterland regions more broadly (Partridge et al., 2008). We measure entrepreneurship through both new firm formation and the presence of micro firms, with particular attention to knowledge-intensive firms given their role in knowledge spillovers and regional development (Stam & Wennberg, 2009).

This paper addresses the gap in micropolitan research by examining how entrepreneurship shapes regional growth across all 290 Swedish municipalities from 2007 to 2023, with particular focus on whether and how these relationships differ across micropolitan, urban, and rural regions. This study contributes to the literature in three ways. First, it extends the micropolitan research agenda beyond the US to a European context, offering evidence from a country where intermediate regions account for a

substantial share of both territory and population. Second, it emphasizes entrepreneurship as a key mechanism shaping growth in these intermediate regions, where traditional labor markets often provide limited opportunities. Third, it explores how remoteness and sectoral specialization moderate the effects of entrepreneurship on regional growth. Together, these contributions have implications for place-based policies that need to account for the distinct entrepreneurial and growth dynamics of different region types (cf. Eliasson and Westlund (2013)). The rest of the paper is organized as follows. Section 2 outlines the empirical strategy. Section 3 presents descriptive statistics. Section 4 reports regression results, and Section 5 concludes.

2. Empirical strategy

2.1 Data and variables

We use publicly available municipality-level data from Statistics Sweden (SCB), combined with aggregated geocoded microdata covering the full population of firms and individuals. The data are longitudinal, covering all 290 Swedish municipalities over the period 2007–2023¹.

Regional growth variables are constructed from annual municipal data. We calculate growth in nighttime population, employment (daytime population), labor productivity (Gross Regional Product in 2020 prices per employed person), and average wages (wage sum in 2020 prices per employed person)². Population growth captures the overall regional attractiveness, employment growth reflects labor-market expansion, productivity growth captures efficiency gains and structural upgrading, and wage growth reflects changes in labor income and job quality. Together these measures provide a balanced view of both quantitative and qualitative dimensions of regional development.

Entrepreneurship variables are derived from annual microdata. We calculate the entry rate as the number of new firms³ relative to the working-age population (ages 20-64), and measure the share of self-employed individuals within the daytime working-age population⁴ in each municipality and year. We also calculate the annual share of micro firms, defined as single-establishment firms with fewer than ten employees, in each municipality. Following Eurostat's definitions, we classify new firms, self-employed individuals, and micro firms as engaging in knowledge-intensive activities (KIA) or not, based on industry affiliation (see Appendix A), and compute the share of KIA entities within each respective population.

Control variables are primarily constructed from publicly available annual municipal data. Human capital is measured as the share of highly educated individuals (at least three years of higher education) in the 25-64 age group (daytime population), , which is expected to be particularly important

¹ We start in 2007 as the SNI industry classification changed from this year, creating a structural break. 2023 is the last year of microdata availability.

² We have also calculated growth in GRP and wage sums, but due to strong correlation with productivity and employment growth respectively, these are not included in the analysis.

³ Firms created through divisions of existing firms or through mergers are not counted as new firms.

⁴ Daytime population includes all individuals working in the municipality regardless of place of residence, classified as employed by Statistics Sweden.

for wage and productivity growth (Mankiw et al., 1992; Mincer, 1984; Mincer, 1974; Romer, 1989, 1990) Demographic structure is captured by the shares of younger (aged 15–29) and older (aged 65+) individuals. Industry structure is controlled for using location quotients (LQ) for mining and quarrying, manufacturing, and accommodation and food services, proxying the intensity of mining, manufacturing, and tourism respectively. We include the employment rate to capture overall labor market functioning, and capital intensity – constructed by aggregating tangible fixed assets from establishment level to municipal level and dividing by total employment – to capture physical capital accumulation, following traditional growth models (Solow, 1956). Finally, population density (nighttime population per square kilometer) serves as a proxy for agglomeration economies (Duranton & Puga, 2004).

2.2 Identifying micropolitan regions

Municipalities containing a delineated urban area (*tätort*) with 10,000 to 50,000 inhabitants are classified as micropolitan, following the US concept of micropolitan statistical areas anchored by an urban cluster of similar size. Based on this definition, 97 out of 290 Swedish municipalities are micropolitan, 38 are larger (hereafter 'urban'), and 155 are smaller (hereafter 'rural'). Municipalities are further distinguished by accessibility: non-remote municipalities have less than a 45-minute drive to an urban area with at least 50,000 inhabitants (Tillväxtverket, 2025), while remote municipalities exceed this threshold. All urban municipalities are by definition non-remote. Of the 97 micropolitan municipalities, 71 are non-remote (hereafter 'close') and 26 are remote; of the 155 rural municipalities, 84 are close and 71 are remote.

Figure 1 illustrates the geographic distribution of municipality types across Sweden. Micropolitan regions are concentrated outside the metropolitan cores but well distributed across southern and central Sweden, with remote micropolitan areas primarily located in the northern inland.

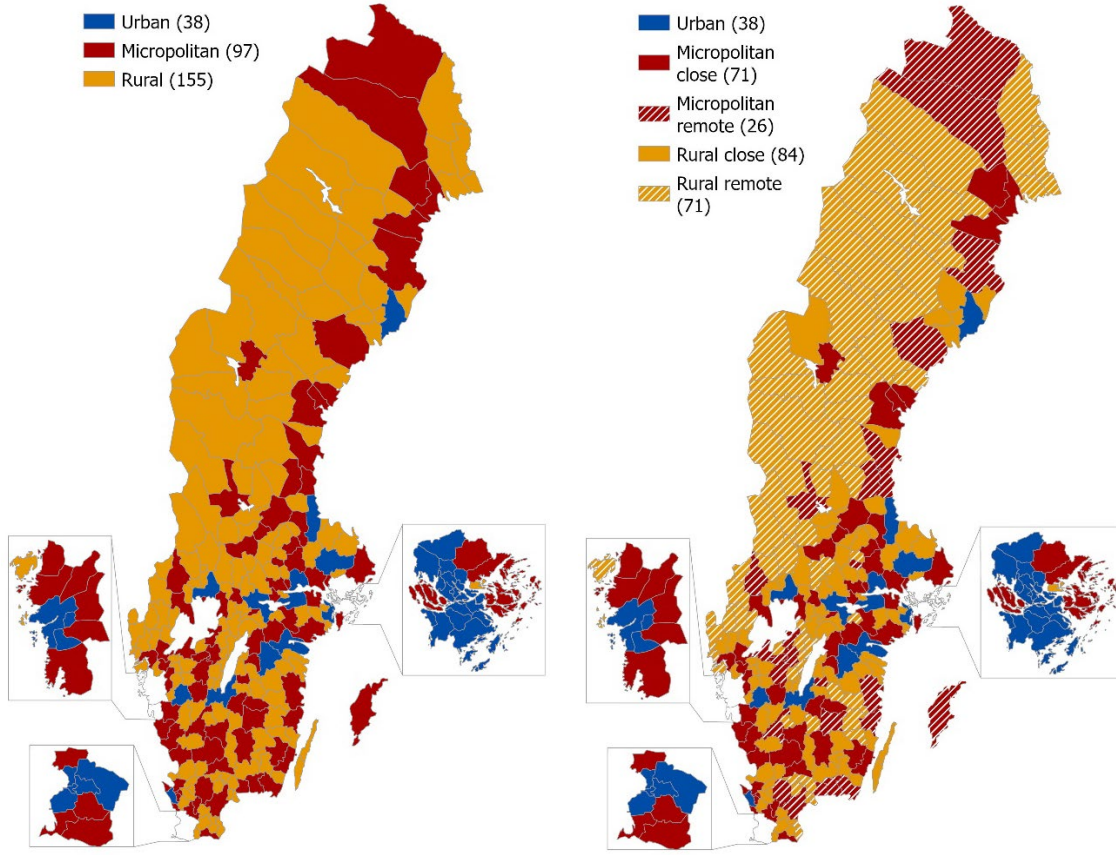


Figure 1. Geographic location of (various types of) micropolitan regions.

2.3 Model and estimation

We estimate the relationship between entrepreneurship and subsequent regional growth using a dynamic fixed effects panel model:

$$\Delta \ln Y_{m,t,t-i} = \alpha_m + \mu_t + \beta' ENT_{m,t-i} + \gamma' X_{m,t-i} + \varphi \ln Y_{m,t-i} + \varepsilon_{m,t} \quad (1)$$

where $\Delta Y_{m,t,t-i}$ denotes growth in population, employment, productivity, or average wages for municipality m over the period $t-i$ to t , defined as $\ln Y_{m,t} - \ln Y_{m,t-i}$. We estimate the model using $i=1$ (annual), $i=3$ (three-year), and $i=5$ (five-year) to capture short- and medium-term dynamics. $ENT_{m,t-i}$ is a vector of entrepreneurship indicators and $X_{m,t-i}$ a vector of control variables, both lagged by i periods. Municipality and year fixed effects (α_m, μ_t) account for time-invariant heterogeneity and common shocks, while $\ln Y_{m,t-i}$ captures persistence in local economic conditions. $\varepsilon_{m,t}$ is the idiosyncratic error term.

Including a lagged dependent variable in a fixed-effects model may introduce Nickell (1981) bias. However, with a moderately long time dimension ($T = 14$), this bias is expected to be limited and to primarily affect the dynamic parameter φ rather than the coefficients of the explanatory variables (Bruno, 2005; Judson & Owen, 1999). Entrepreneurship variables are treated as predetermined,

implying that they may respond to past conditions but not contemporaneously to shocks in period t . For the multi-year specifications, overlapping growth windows induce serial correlation in the error term: we therefore use heteroskedasticity-robust standard errors clustered at the municipality level throughout.

To examine spatial heterogeneity, we estimate the model separately for urban, micropolitan, and rural municipalities, and introduce interaction terms between entrepreneurship and remoteness as well as tourism intensity. Pooled OLS estimates are reported alongside fixed effects estimates to capture cross-sectional variation. As a robustness check, we complement the baseline estimates with System GMM (Arellano & Bond, 1991; Blundell & Bond, 1998; Roodman, 2009a), treating the lagged dependent variable and entrepreneurship indicators as endogenous and instrumenting them using deeper lags, estimated with the two-step robust estimator with Windmeijer (2005) correction. Given their sensitivity to specification choices, GMM results are used for robustness rather than as baseline estimates.

3. Descriptive statistics

3.1 Regional growth

Figure 2 illustrates growth trajectories across urban, micropolitan, and rural regions over 2007–2023. Urban regions show the strongest and most consistent growth across all indicators, while micropolitan regions occupy an intermediate position, with population and employment growth exceeding rural areas but remaining below urban levels. Productivity is more volatile in urban and rural regions, whereas micropolitan regions exhibit more stable trends. Wage growth differs less across region types, suggesting that income dynamics are less sensitive to spatial hierarchy than other growth dimensions. Figure 3 adds a spatial dimension by distinguishing close and remote non-urban regions. Micropolitan regions closer to urban centers generally experience stronger population and employment growth, while remote areas show slower and more volatile development. Rural regions display an even sharper divide, with remote areas experiencing persistent stagnation.

Table 1 reports correlations between growth indicators. Population and employment growth are positively correlated, while their relationship with productivity is weak. Notably, employment growth is negatively correlated with wage growth, suggesting a potential trade-off between extensive and intensive growth margins – a theme explored further in the empirical analysis. Summary statistics in Appendix C confirm that urban regions dominate in terms of size and that micropolitan regions occupy an intermediate position, while productivity levels – particularly in remote regions – exhibit substantial variability.

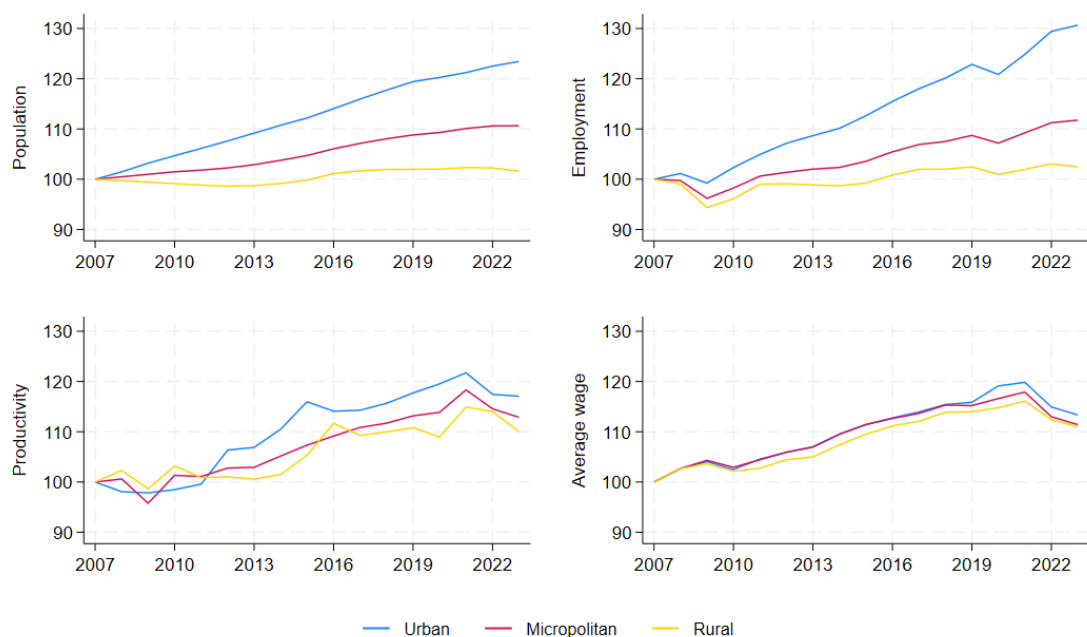


Figure 2. Change in outcome variables (indexed 2007=100) by municipality type, 2007-2023.

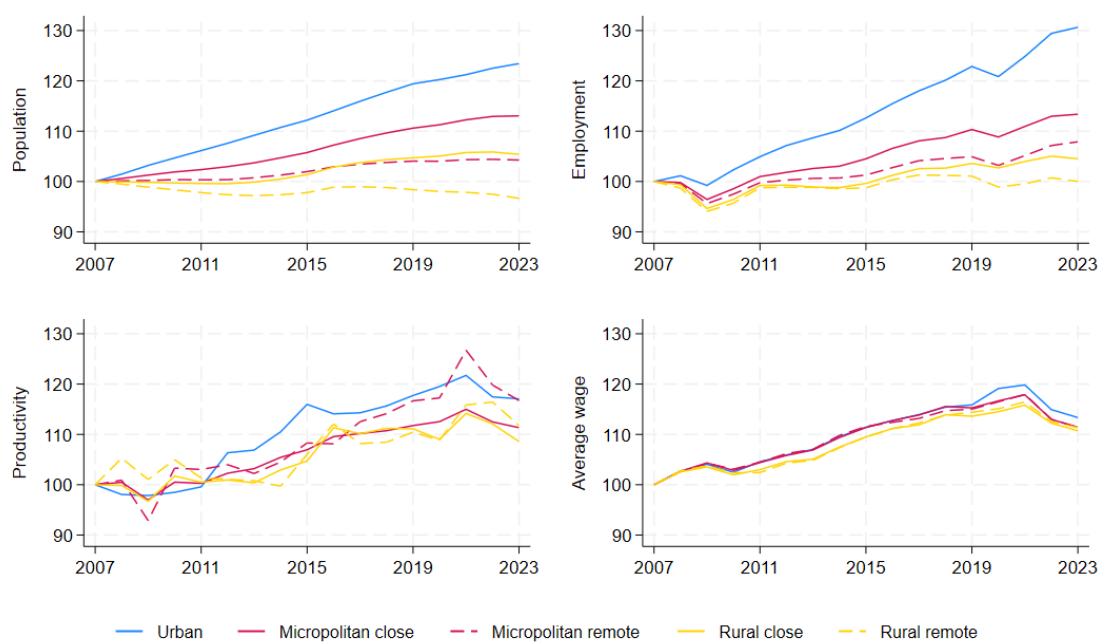


Figure 3. Change in outcome variables by municipality type, including close (solid lines) and remote (dashed lines) of non-urban municipalities, 2007-2023.

Table 1. 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.

3.2 Entrepreneurship

Table 2 presents correlations among entrepreneurship indicators. Entry rate, self-employment, and micro firms show modest to strong mutual correlations, suggesting they capture similar aspects of entrepreneurial activity. Due to data limitations and structural changes in self-employment definitions, micro firms and entry rate are used as the main proxies in the analysis. KIA entrepreneurship measures are highly correlated with each other but weakly correlated with the general indicators, suggesting they capture a distinct dimension – quality rather than quantity of entrepreneurship.

Table 2. 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.

Figure 4 shows that rural regions exhibit the highest levels of entrepreneurship across most indicators, while urban regions have the lowest shares of micro firms and self-employment. Entry rates are more similar across region types. Micropolitan regions generally lie between urban and rural areas, though resembling urban regions more closely in terms of entry rates. These patterns are consistent with the idea that entrepreneurship in less urbanized regions reflects both limited labor market opportunities and the exploitation of local market niches. Knowledge-intensive entrepreneurship, by contrast, is concentrated in urban regions, with micropolitan regions occupying an intermediate position and rural regions lagging behind. Figure 5 shows that accessibility further shapes these patterns, with KIA activity consistently higher in regions closer to urban centers. Summary statistics in Appendix D confirm all these patterns.

3.3 Further descriptive statistics

Summary statistics, correlations, and panel descriptives for all variables are presented in Appendices C–F. Notably, there is a strong correlation between the share of highly educated individuals and knowledge-intensive entrepreneurial activity (micro KIA firms), which is worth bearing in mind when interpreting the KIA results. Most variables have sufficient within variation for fixed effects estimation; the exceptions are population (ln), employment (ln), and population density (ln), where within variation is close to or less than five percent of overall variation.

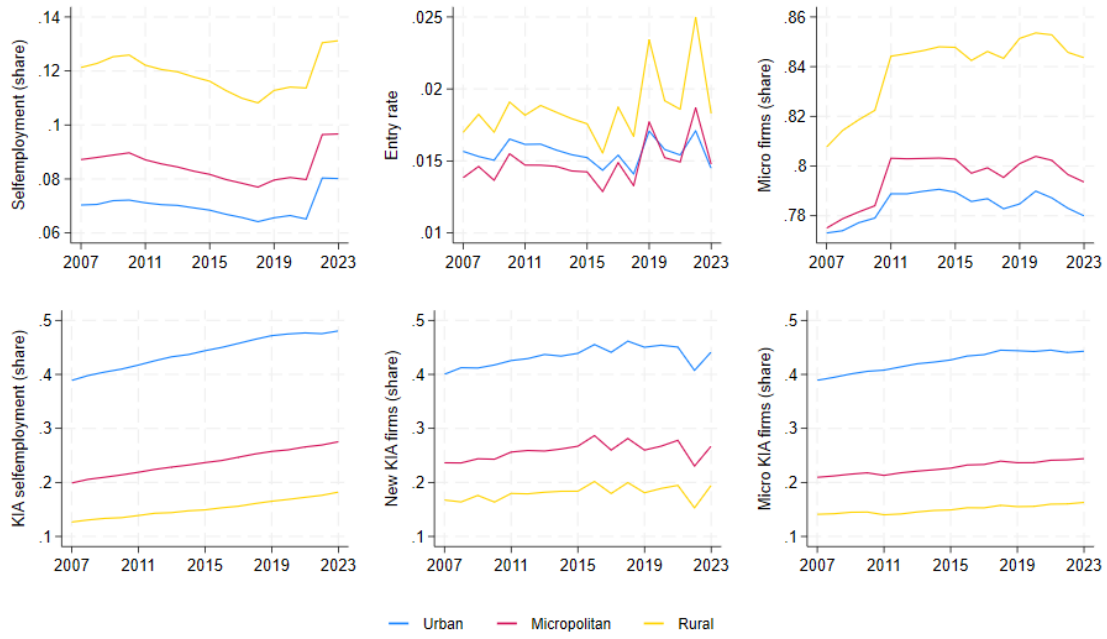


Figure 4. Change in entrepreneurship variables by municipality type, 2007-2023.

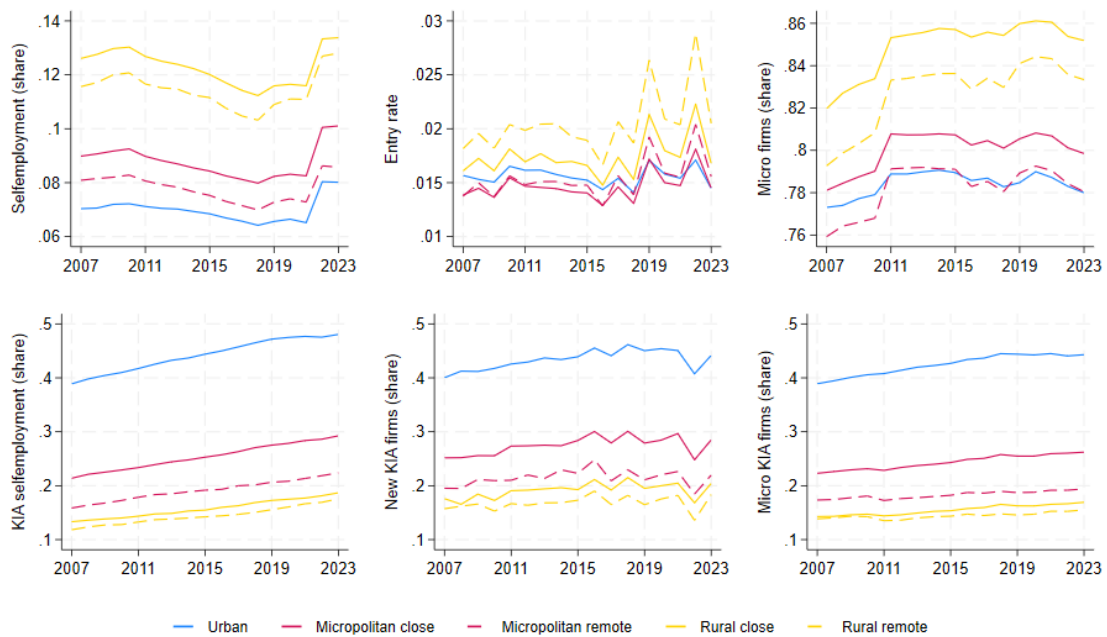


Figure 5. Change in entrepreneurship variables by municipality type, including close (solid lines) and remote (dashed lines) of non-urban municipalities, 2007-2023.

4. The relationship between entrepreneurship and regional growth

Table 3 presents pooled OLS (POLS) and municipality fixed effects (FE) estimates of the relationship between entrepreneurship and annual growth in population, employment, productivity, and average wages. Longer-term estimates for three- and five-year growth are reported in Appendix G (Tables G1–G2) and broadly confirm the main patterns, although within-municipality relationships remain limited.

Table 3. Relationship between entrepreneurship and one-year regional growth, 2007–2023. All regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0007 (0.0005)	-0.0079 (0.0070)	0.0007 (0.0007)	-0.2186*** (0.0150)	-0.1551*** (0.0281)	-0.5959*** (0.0293)	-0.0340*** (0.0061)	-0.3336*** (0.0200)
Entry rate	-0.0200 (0.0516)	-0.0206 (0.0440)	0.0380 (0.1102)	0.2732 (0.1738)	0.9239** (0.4362)	-0.6388 (0.4889)	0.1356** (0.0625)	0.0145 (0.1046)
Micro firms	0.0209*** (0.0055)	0.0362** (0.0142)	0.0269** (0.0109)	-0.0189 (0.0439)	-0.0517 (0.0501)	-0.1798 (0.1691)	-0.0211*** (0.0075)	-0.0427 (0.0332)
LQ tourism	0.0020*** (0.0004)	-0.0004 (0.0011)	0.0013** (0.0006)	-0.0023 (0.0022)	0.0041 (0.0037)	-0.0049 (0.0085)	0.0010*** (0.0004)	-0.0005 (0.0021)
LQ mining	-0.0000** (0.0000)	-0.0001 (0.0001)	0.0000 (0.0000)	-0.0004** (0.0002)	0.0009*** (0.0003)	0.0049*** (0.0011)	0.0001*** (0.0000)	0.0005** (0.0002)
LQ manu- facturing	-0.0002 (0.0003)	0.0003 (0.0007)	-0.0014** (0.0005)	0.0041 (0.0032)	0.0061** (0.0025)	0.0023 (0.0101)	0.0011*** (0.0003)	0.0098*** (0.0021)
Highly educated	-0.0064 (0.0061)	0.0337 (0.0282)	0.0126 (0.0091)	0.1223* (0.0725)	0.0898*** (0.0285)	0.0715 (0.3273)	0.0129*** (0.0042)	0.1685*** (0.0644)
Age 15–29	0.0324* (0.0170)	-0.0400 (0.0313)	0.0031 (0.0314)	0.0324 (0.0826)	-0.0758 (0.0990)	-0.5369 (0.3324)	0.0155 (0.0165)	0.1375** (0.0690)
Age 65+	-0.0599*** (0.0099)	0.0880*** (0.0230)	-0.0866*** (0.0157)	-0.1223** (0.0544)	-0.1103 (0.0677)	-0.0625 (0.2267)	-0.0024 (0.0094)	0.1581*** (0.0498)
Population density (ln)	0.0016*** (0.0003)		0.0003 (0.0004)	0.1631*** (0.0208)	0.0028 (0.0031)	-0.0608 (0.0729)	0.0012*** (0.0003)	0.0221 (0.0146)
Capital intensity (ln)	0.0008* (0.0005)	0.0008 (0.0007)	0.0011 (0.0009)	0.0045** (0.0021)	0.0260*** (0.0050)	-0.0163 (0.0116)	0.0012** (0.0005)	-0.0004 (0.0015)
Employment rate	0.0309*** (0.0057)	0.0050 (0.0127)	-0.0064 (0.0100)	0.0130 (0.0381)	0.0418 (0.0382)	-0.3437** (0.1554)	0.0281*** (0.0089)	0.1217*** (0.0278)
<i>Region type</i>								
Micropolitan close	-0.0005 (0.0010)		-0.0011 (0.0018)		-0.0082 (0.0053)		-0.0004 (0.0007)	
Micropolitan remote	-0.0023** (0.0011)		-0.0021 (0.0020)		-0.0074 (0.0061)		-0.0010 (0.0008)	
Rural close	-0.0014 (0.0015)		-0.0021 (0.0025)		-0.0175** (0.0081)		-0.0020* (0.0011)	
Rural remote	-0.0035** (0.0015)		-0.0026 (0.0026)		-0.0085 (0.0076)		-0.0008 (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		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.

Starting with the share of micro firms, the estimates indicate a positive association with population and employment growth in the POLS specifications, while the relationship remains positive and statistically significant only for population growth in the FE models. In contrast, the share of micro firms is negatively associated with wage growth in the POLS specification and shows no robust relationship

with productivity growth. The results for three- and five-year growth largely mirror these patterns, with positive cross-sectional associations for population and employment growth but weak or insignificant effects in the FE specifications. These findings suggest that a higher prevalence of micro firms is primarily linked to expansion along extensive margins, with limited evidence of contributions to productivity or wage growth.

Turning to entry rates, the results show a positive association with productivity and wage growth in the POLS models. However, these relationships are not robust to the inclusion of municipality fixed effects, indicating that they are driven by cross-sectional differences rather than within-municipality variation over time. The longer-term estimates reinforce this interpretation: while the positive association with productivity growth becomes even stronger in the POLS specifications over three- and five-year horizons, it remains insignificant in the FE models. This contrasts with the standard view of entry as a driver of innovation and growth, and instead aligns with research highlighting that the growth effects of entrepreneurship likely depend on its quality and context (Stam, 2010).

Among the control variables, human capital is positively associated with wage growth, particularly in the FE specifications and over longer horizons, consistent with standard human capital theory (Mankiw et al., 1992; Mincer, 1984; Romer, 1989, 1990). Mining intensity is consistently associated with higher productivity and wage growth across specifications, while tourism intensity shows positive cross-sectional associations with population, employment, and wage growth that disappear in the FE models. Population density is positively associated with employment growth across specifications, but shows limited effects on other outcomes once municipal fixed effects are included, providing limited support for a central role of agglomeration economies (Duranton & Puga, 2004).

4.1 Heterogeneity across municipality types

Since the focus of the paper is on growth dynamics in micropolitan regions, we split the sample and re-estimate the models separately for micropolitan, urban, and rural regions. Tables 4–6 report the results for annual growth, while Appendix G presents the corresponding results for three- and five-year growth (Tables G3–G8).

Focusing on micropolitan regions (Table 4), two main patterns emerge. First, the share of micro firms is consistently positively associated with population growth, suggesting that small-scale entrepreneurship contributes to the extensive margin of micropolitan development in terms of population attraction and retention. While the micro firm share is also positively associated with employment growth in the POLS specification, this relationship is not robust in the FE model, indicating that cross-sectional factors dominate. There is no consistent relationship with productivity or wage growth, reinforcing the interpretation that micro firms primarily expand quantities rather than contribute to improvements along the intensive margin. This is consistent with research showing that small-scale, locally embedded firms in non-urban regions tend to support employment and local economic activity

while often remaining oriented toward local markets (North & Smallbone, 2000). The longer-term estimates in Appendix G broadly confirm these patterns.

Table 4. Relationship between entrepreneurship and one-year regional growth, 2007-2023. Micropolitan regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0008 (0.0008)	0.0121 (0.0100)	0.0017 (0.0013)	-0.2284*** (0.0302)	-0.2417*** (0.0477)	-0.6398*** (0.0422)	-0.0212 (0.0137)	-0.2879*** (0.0371)
Entry rate	-0.0039 (0.0965)	-0.0477 (0.1135)	-0.0907 (0.2784)	0.1239 (0.3695)	0.2531 (1.2280)	-1.2431 (1.7268)	0.2426 (0.1832)	0.4380 (0.2869)
Micro firms	0.0354*** (0.0074)	0.0521** (0.0208)	0.0368** (0.0160)	-0.0259 (0.0718)	-0.0158 (0.0980)	0.0922 (0.3298)	-0.0074 (0.0121)	-0.0316 (0.0422)
LQ tourism	0.0021*** (0.0007)	-0.0008 (0.0015)	0.0053** (0.0021)	-0.0016 (0.0060)	0.0236** (0.0103)	0.0097 (0.0286)	0.0008 (0.0010)	0.0003 (0.0037)
LQ mining	-0.0000 (0.0000)	0.0001 (0.0001)	0.0000 (0.0000)	-0.0007*** (0.0002)	0.0014*** (0.0004)	0.0070*** (0.0011)	0.0001*** (0.0000)	0.0010*** (0.0003)
LQ manu- facturing	0.0002 (0.0004)	0.0007 (0.0015)	-0.0009 (0.0009)	-0.0025 (0.0064)	0.0155*** (0.0050)	0.0020 (0.0240)	0.0014* (0.0008)	0.0113** (0.0046)
Highly educated	0.0037 (0.0066)	0.0181 (0.0244)	0.0107 (0.0130)	0.1546* (0.0910)	0.1293* (0.0707)	0.6346 (0.6788)	0.0205** (0.0092)	0.1862 (0.1185)
Age 15-29	0.0835*** (0.0223)	-0.0668 (0.0436)	0.0315 (0.0549)	-0.0684 (0.1331)	-0.3867* (0.2206)	-0.4643 (0.6653)	0.0121 (0.0251)	0.1360 (0.1163)
Age 65+	-0.0111 (0.0104)	0.1375*** (0.0337)	-0.0541** (0.0207)	0.0106 (0.1039)	-0.4056*** (0.1492)	-0.9540 (0.6291)	-0.0099 (0.0113)	0.2527** (0.0986)
Population density (ln)	0.0021*** (0.0003)		0.0007 (0.0007)	0.1454*** (0.0368)	-0.0039 (0.0057)	-0.4062** (0.1669)	0.0008 (0.0005)	0.0941*** (0.0273)
Capital intensity (ln)	0.0008 (0.0007)	0.0005 (0.0012)	-0.0002 (0.0014)	0.0048 (0.0035)	0.0277** (0.0109)	0.0087 (0.0171)	0.0003 (0.0009)	0.0033 (0.0033)
Employment rate	0.0365*** (0.0073)	-0.0151 (0.0186)	0.0365** (0.0177)	0.0807 (0.0686)	-0.0318 (0.0937)	-0.7374** (0.2878)	0.0286** (0.0115)	0.0273 (0.0492)
Remote	-0.0021*** (0.0005)	-0.0021*** (0.0005)	-0.0009 (0.0010)	-0.0009 (0.0010)	-0.0012 (0.0054)	-0.0012 (0.0054)	-0.0003 (0.0006)	-0.0003 (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 Population 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 one year.

The second key pattern concerns entry rates. In the annual specifications, entry rate shows no association with any growth outcome in either specification. However, the longer-term results suggest a more nuanced picture: entry rates are negatively associated with population and employment growth in the FE specifications over three- and five-year horizons, suggesting that higher entry may reflect short-run restructuring or adjustment processes that do not translate into sustained within-municipality growth. This is consistent with evidence that the employment effects of new business creation are strongly conditioned by regional context, including population trajectories and local market conditions (Delfmann & Koster, 2016).

Among the control variables, mining intensity is consistently associated with higher productivity and wage growth while being negatively related to employment in the FE models, pointing to a pattern of intensive rather than extensive growth. Population density is positively associated with

employment and wage growth in both POLS and FE specifications, providing evidence of agglomeration-type effects that are more prominent in micropolitan regions than in the full sample. Human capital shows limited effects in the annual FE models but becomes more strongly associated with wage and employment growth over longer horizons, suggesting that skill composition matters primarily in the longer term.

While micropolitan regions show that small-scale entrepreneurship primarily drives demographic expansion rather than structural upgrading (Table 4), an important question is whether similar patterns emerge in more urbanized or more rural contexts. Tables 5 and 6 provide this comparison for urban and rural municipalities, respectively, revealing clear differences across the spatial hierarchy.

Table 5. 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** (0.0008)	0.0142 (0.0155)	0.0015 (0.0012)	-0.1464*** (0.0288)	-0.1162*** (0.0299)	-0.4570*** (0.0602)	-0.0338*** (0.0118)	-0.3120*** (0.0486)
Entry rate	-0.0920 (0.2804)	-0.2763 (0.3381)	0.1921 (0.4581)	0.2572 (1.1099)	1.8218 (1.0918)	-3.2855* (1.8682)	-0.0380 (0.2028)	-0.5682 (0.4329)
Micro firms	-0.0066 (0.0155)	-0.1107** (0.0494)	-0.0200 (0.0247)	-0.2702* (0.1391)	-0.0739 (0.0820)	-0.4303 (0.4651)	-0.0125 (0.0124)	-0.1563** (0.0692)
LQ tourism	0.0016 (0.0015)	-0.0071* (0.0040)	-0.0110*** (0.0023)	-0.0171 (0.0123)	0.0019 (0.0065)	0.0411 (0.0269)	-0.0004 (0.0012)	0.0058 (0.0068)
LQ mining	-0.0048** (0.0019)	-0.0038 (0.0024)	-0.0029 (0.0041)	-0.0039 (0.0056)	-0.0125 (0.0082)	-0.0127 (0.0196)	0.0018 (0.0024)	-0.0027 (0.0038)
LQ manu- facturing	0.0002 (0.0011)	0.0014 (0.0026)	-0.0014 (0.0015)	0.0047 (0.0057)	0.0253** (0.0099)	0.0176 (0.0153)	0.0014 (0.0012)	0.0120** (0.0044)
Highly educated	-0.0068 (0.0099)	-0.1001* (0.0588)	0.0136 (0.0156)	0.0852 (0.1566)	0.0611** (0.0293)	-0.2237 (0.3867)	0.0143* (0.0071)	0.2850*** (0.0767)
Age 15-29	0.0432 (0.0537)	0.0280 (0.0935)	-0.1204 (0.0758)	-0.1655 (0.2595)	0.0973 (0.1595)	-1.5683*** (0.5416)	0.0471 (0.0345)	0.0555 (0.1296)
Age 65+	-0.1047** (0.0424)	0.1603** (0.0627)	-0.2015** (0.0821)	-0.1900 (0.2315)	-0.2288 (0.1414)	0.4515 (0.6540)	-0.0085 (0.0377)	0.0756 (0.1334)
Population density (ln)	0.0011 (0.0009)		-0.0020 (0.0015)	0.1128 (0.0677)	0.0046 (0.0029)	-0.1256 (0.1414)	0.0018** (0.0007)	-0.0287 (0.0317)
Capital intensity (ln)	0.0013 (0.0013)	-0.0004 (0.0013)	0.0060*** (0.0017)	0.0062 (0.0045)	0.0123 (0.0075)	0.0086 (0.0114)	0.0002 (0.0011)	-0.0040** (0.0015)
Employment rate	0.0167 (0.0148)	0.0386 (0.0450)	-0.0048 (0.0274)	0.2107 (0.1660)	0.0787 (0.0644)	-0.4171 (0.3685)	0.0201 (0.0131)	0.0819 (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 Population 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 one year.

A first key contrast concerns the role of micro firms. In micropolitan regions, the share of micro firms is positively and robustly associated with population growth, indicating that small-scale entrepreneurship contributes to the extensive margin of development. In rural regions, a similar pattern

emerges in the cross-sectional (POLS) results, where micro firms are positively associated with population and employment growth but negatively related to productivity and wage growth, suggesting expansion without upgrading. However, these effects are not robust in the FE specifications, indicating that they are largely driven by between-municipality differences rather than within-region dynamics.

In contrast, urban regions display a markedly different pattern: the share of micro firms is negatively associated with several growth outcomes in the FE specifications, particularly population, employment, and wages. This suggests that in more developed urban economies, a higher prevalence of micro firms may reflect fragmentation or lower firm quality rather than entrepreneurial dynamism. The differences across region types are consistent with the literature on agglomeration economies, which emphasizes the importance of scale, firm maturity, and human capital in dense urban environments (Glaeser et al., 1992; Rosenthal & Strange, 2004). These findings support the view that entrepreneurship plays fundamentally different roles across the spatial system – supporting population and employment growth in micropolitan regions, while its effects are more limited or even negative in urban settings and largely cross-sectional in rural areas – consistent with arguments that intermediate and peripheral regions follow distinct development trajectories shaped by their position within the urban–rural hierarchy (Dijkstra et al., 2013; Roberts & Hohmann, 2014), and with evidence that the growth effects of entrepreneurship vary systematically across regional contexts depending on local institutional and cultural conditions (Fritsch & Wyrwich, 2017).

A second important difference concerns firm entry. In micropolitan regions, entry rates show no short-run effects and are even negatively associated with population and employment growth over longer horizons. In rural regions, by contrast, entry is positively associated with productivity and wage growth in the cross-sectional (POLS) specifications across all growth windows, while the FE estimates indicate a positive effect on annual employment growth. This suggests that new firm formation in rural areas is linked to both higher-quality economic structures across places and short-run job creation within municipalities. In urban regions, entry effects are generally weak and imprecisely estimated, with little evidence of consistent within-municipality effects.

Population density is positively associated with employment and wage growth in the FE specifications for both micropolitan and rural regions, while effects in urban areas are weaker and less consistent, suggesting diminishing returns to density in already dense environments. Structural factors also differ across region types: human capital is the key predictor of wage growth in urban regions, while sectoral composition – particularly mining – plays a larger role in micropolitan and rural regions. This suggests that growth outside urban areas is more closely tied to sectoral specialization, whereas urban growth is more strongly driven by human capital.

Table 6. 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** (0.0006)	-0.0177* (0.0100)	-0.0004 (0.0011)	-0.2447*** (0.0207)	-0.1459*** (0.0341)	-0.6134*** (0.0380)	-0.0452*** (0.0085)	-0.3786*** (0.0276)
Entry rate	0.0433 (0.0489)	-0.0009 (0.0490)	0.1051 (0.1376)	0.3811* (0.1956)	1.1423* (0.5902)	-0.2048 (0.5624)	0.1747** (0.0850)	-0.0221 (0.1284)
Micro firms	0.0120* (0.0071)	0.0228 (0.0194)	0.0366** (0.0154)	-0.0095 (0.0626)	-0.1478* (0.0880)	-0.2284 (0.2047)	-0.0519*** (0.0147)	-0.0631 (0.0462)
LQ tourism	0.0017*** (0.0003)	0.0006 (0.0012)	0.0012 (0.0007)	-0.0022 (0.0024)	0.0007 (0.0036)	-0.0121 (0.0103)	0.0015*** (0.0005)	-0.0012 (0.0023)
LQ mining	0.0000 (0.0000)	-0.0001 (0.0001)	0.0001 (0.0001)	-0.0003 (0.0003)	0.0004 (0.0004)	0.0038*** (0.0014)	0.0001** (0.0001)	0.0005** (0.0002)
LQ manu- facturing	0.0002 (0.0004)	0.0002 (0.0009)	-0.0007 (0.0008)	0.0088** (0.0040)	0.0026 (0.0024)	-0.0002 (0.0117)	0.0009** (0.0004)	0.0089*** (0.0024)
Highly educated	0.0167 (0.0172)	0.1513*** (0.0419)	0.0411 (0.0295)	0.0872 (0.0966)	0.1783* (0.1064)	-0.2224 (0.4102)	-0.0050 (0.0129)	0.0753 (0.0893)
Age 15-29	-0.0348 (0.0244)	-0.0686 (0.0452)	0.0245 (0.0657)	0.1117 (0.1088)	0.1153 (0.1990)	-0.2101 (0.4491)	-0.0202 (0.0354)	0.1103 (0.1038)
Age 65+	-0.0846*** (0.0108)	0.0397 (0.0305)	-0.0864*** (0.0254)	-0.0934 (0.0698)	0.0029 (0.0858)	0.3342 (0.2731)	-0.0135 (0.0151)	0.0793 (0.0690)
Population density (ln)	0.0014*** (0.0003)		0.0004 (0.0006)	0.1845*** (0.0256)	0.0045 (0.0044)	0.0273 (0.0900)	0.0018*** (0.0004)	0.0516** (0.0199)
Capital intensity (ln)	0.0004 (0.0006)	0.0008 (0.0010)	0.0011 (0.0012)	0.0024 (0.0027)	0.0301*** (0.0076)	-0.0345** (0.0163)	0.0016** (0.0007)	0.0002 (0.0021)
Employment rate	0.0228*** (0.0084)	0.0204 (0.0178)	-0.0324** (0.0156)	-0.0180 (0.0507)	0.0631 (0.0566)	-0.2532 (0.2014)	0.0362** (0.0160)	0.1967*** (0.0348)
Remote	-0.0017*** (0.0005)		-0.0002 (0.0011)		0.0059 (0.0044)		0.0009 (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 Population 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 one year.

4.2 Knowledge-intensive entrepreneurial activities

To assess the role of knowledge-intensive entrepreneurship, as emphasized by Stam and Wennberg (2009), we include the share of micro firms engaged in knowledge-intensive activities (KIA). As noted earlier, this measure is highly correlated with both KIA entry rates and KIA self-employment, as well as with the share of highly educated individuals in the municipality, making it difficult to disentangle the effect of knowledge-intensive entrepreneurship per se from knowledge intensity in general. The only difference from the estimations in Tables 3–6 is the inclusion of micro KIA firms while excluding the share of highly educated; results are summarized in Figures 6–9⁵.

Across all regions (Figure 6), the OLS estimates show a strong positive association between knowledge-intensive entrepreneurship and productivity growth in both the short and medium term. However, this relationship disappears once municipality fixed effects are included, suggesting it is

⁵ Full regression results are available from the corresponding author upon request.

driven by time-invariant local characteristics rather than within-municipality changes – regions with higher levels of KIA activity tend to exhibit higher productivity growth, but increases within a given municipality are not systematically associated with productivity improvements. For wage growth, results are more nuanced: there is evidence of a positive short-run association in the FE specifications, although the effect is relatively weak and not robust over longer horizons. Notably, this association with wages persists when controlling for the share of highly educated individuals, albeit with reduced magnitude, indicating that KIA captures aspects of local economic structure beyond human capital alone.

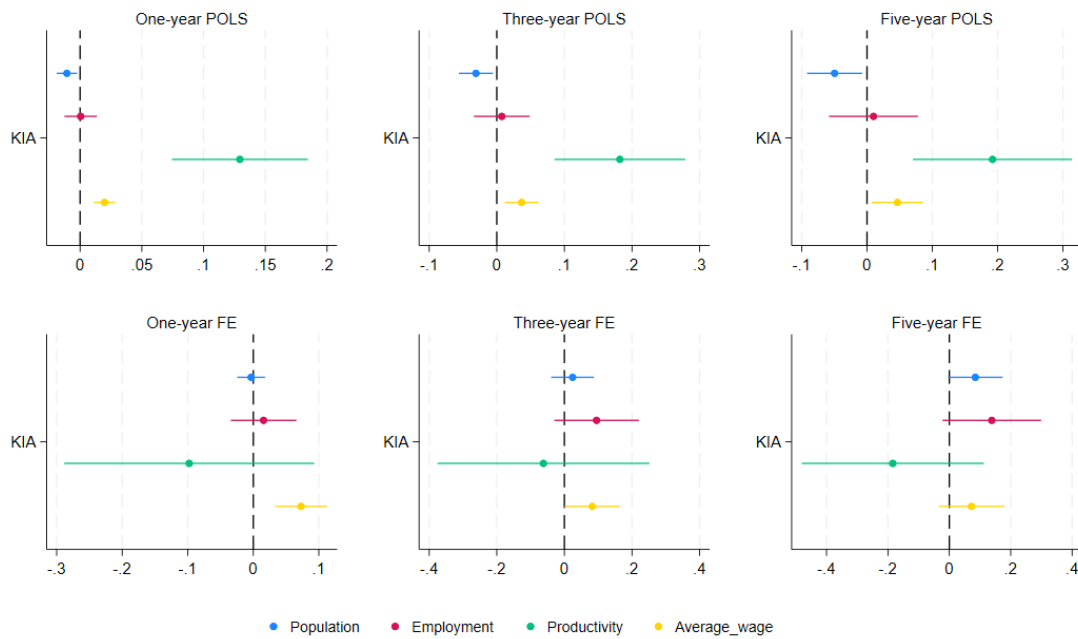


Figure 6. Point estimates and 90 percent confidence intervals for share of micro KIA firms. All regions.

Turning to spatial heterogeneity (Figures 7–9), clear differences emerge across region types. In micropolitan regions, knowledge-intensive entrepreneurship shows no short-run effects but a positive relationship with population and wage growth over longer horizons, suggesting that effects materialize more slowly in these regions. Urban regions exhibit a more immediate and consistent positive association between KIA and wage growth, indicating that knowledge-intensive entrepreneurship is more directly linked to income dynamics in larger economies. Rural regions show no robust relationship between KIA and wage growth, suggesting more limited local spillovers. With respect to population growth, micropolitan and rural regions display similar patterns with positive associations emerging over longer horizons, while urban regions show weak or even negative short-run relationships. Taken together, the economic role of knowledge-intensive entrepreneurship varies substantially across the spatial hierarchy: while strongly correlated with productivity across regions, its within-municipality effects are limited and its impact on wages and population depends on local economic context.

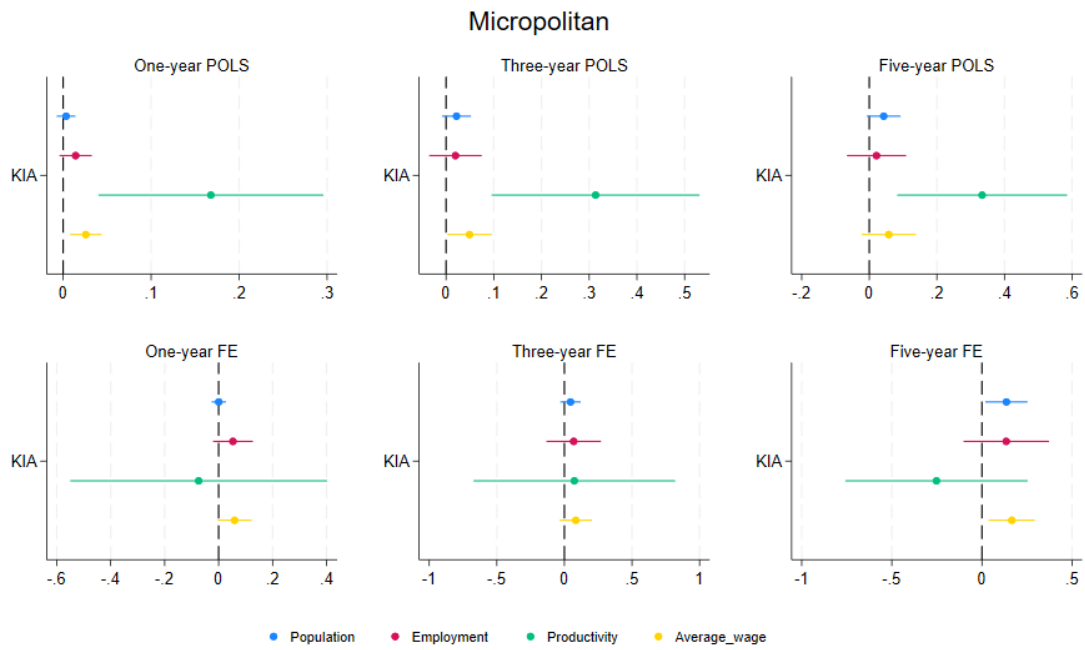


Figure 7. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Micropolitan regions.

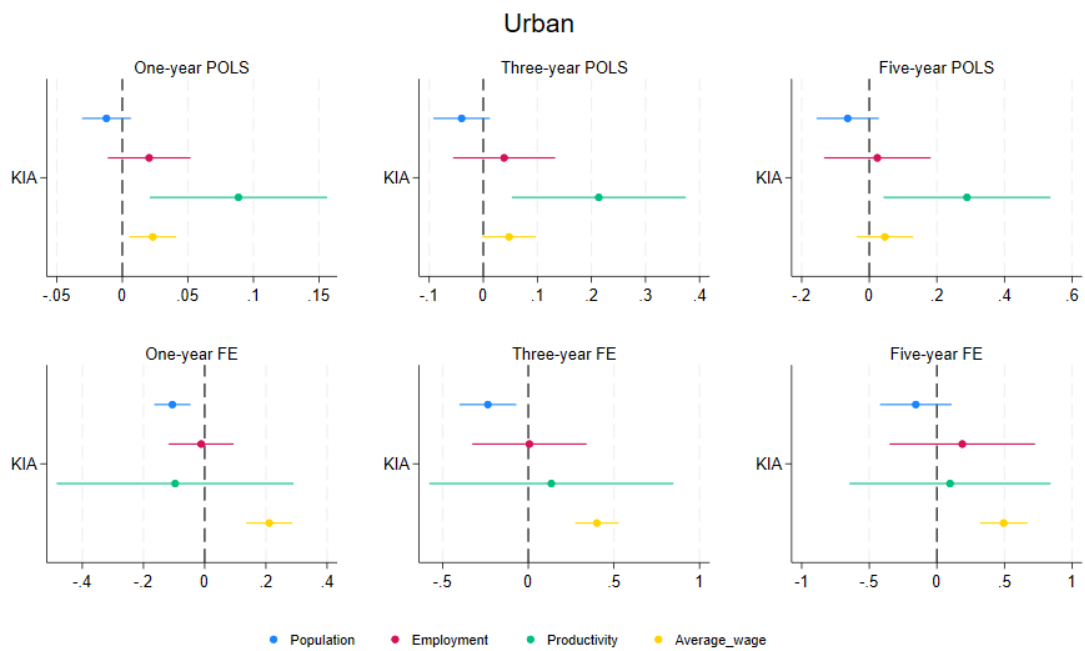


Figure 8. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Urban regions.

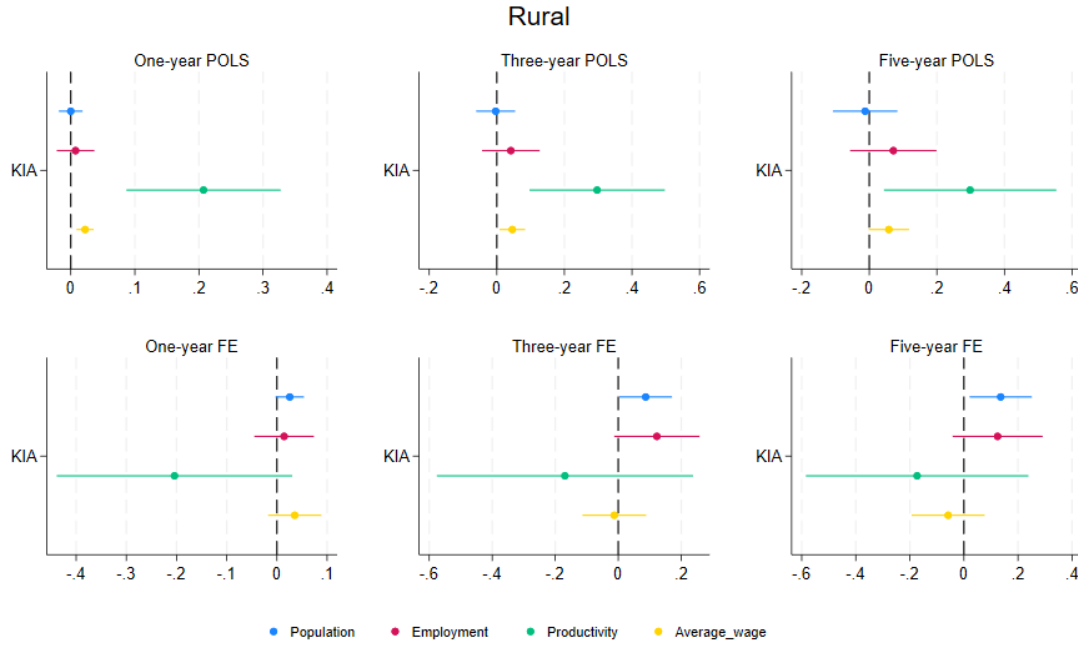


Figure 9. Point estimates and 90 percent confidence intervals for share of micro KIA firms. Rural regions.

4.3 Interactions between local factors and entrepreneurship in micropolitan regions

To further examine how local context shapes the relationship between entrepreneurship and growth, we interact the entrepreneurship indicators with remoteness and tourism intensity, focusing on micropolitan regions. Results from the fixed effects estimations are summarised in Figures 10 and 11.

Starting with remoteness (Figure 10), the positive association between micro firms and annual population growth persists irrespective of whether micropolitan regions are remote or not. However, micro firms are positively related to annual wage growth only in remote regions, suggesting that small-scale entrepreneurship plays a different role in more isolated labour markets. For entry rates, the previously observed negative association with three- and five-year population and employment growth is primarily driven by non-remote regions; in remote micropolitan areas, higher start-up rates are neither significantly positive nor negative, indicating that new firm formation does not translate into substantial growth effects in these locations.

Turning to knowledge-intensive entrepreneurship, KIA activity is particularly important for productivity growth in remote micropolitan regions over short and medium horizons. In non-remote regions, by contrast, a higher share of KIA firms is positively associated with annual employment growth and, to some extent, longer-term population growth, a relationship that is weaker in remote regions. KIA entrepreneurship is positively associated with five-year wage growth across micropolitan regions with no clear difference between remote and non-remote areas. These findings suggest that accessibility shapes how different types of entrepreneurship translate into growth outcomes, with knowledge-intensive activities playing a more prominent role in remote settings for productivity and in accessible settings for employment and population dynamics – consistent with broader evidence that

distance to urban centers systematically conditions economic development in hinterland and small city contexts (Partridge et al., 2008).

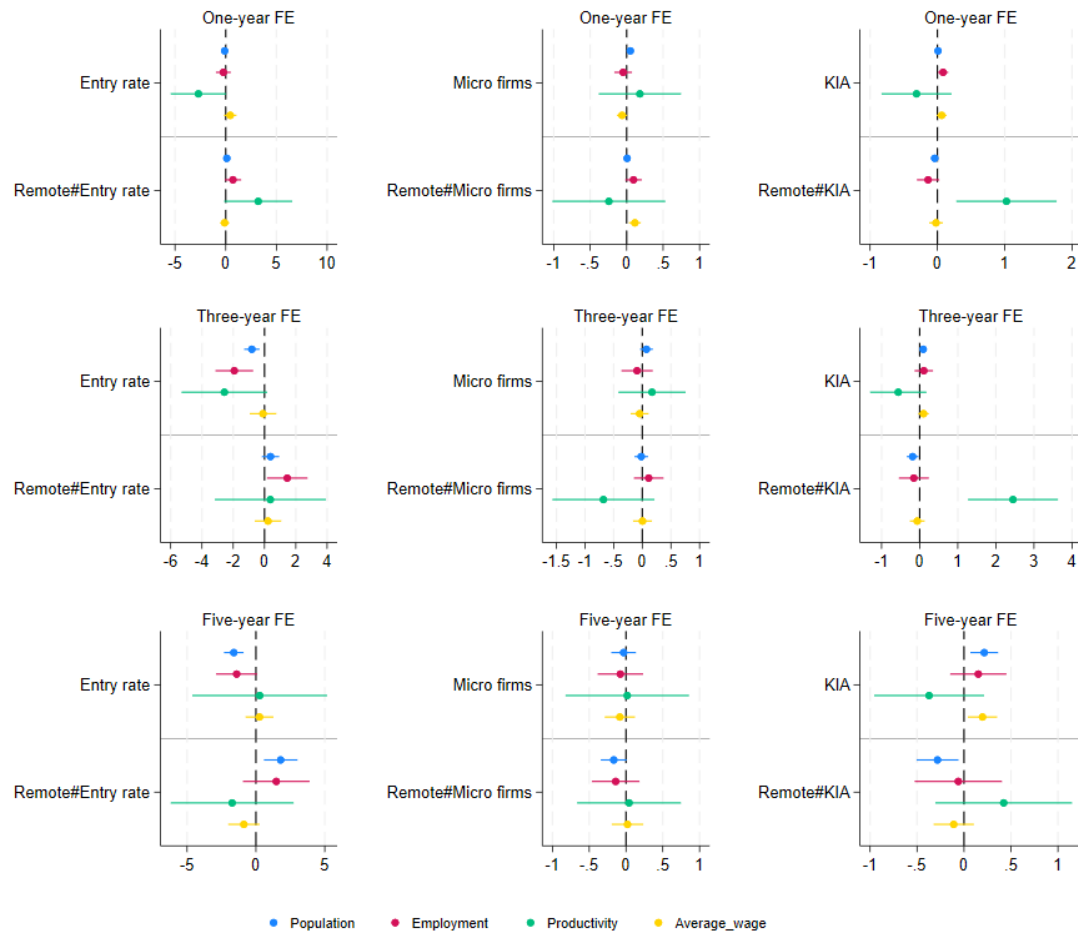


Figure 10. Interaction between entrepreneurship indicators and remoteness. Micropolitan regions.

Figure 11 presents the interaction results with tourism intensity. Tourism intensity on its own shows limited effects, with the exception of a negative association with population growth over longer horizons in the KIA specifications. However, when combined with knowledge-intensive entrepreneurship, higher tourism intensity is associated with stronger population growth over three- and five-year periods, suggesting that the positive relationship between KIA and population growth is partly driven by tourism-oriented micropolitan regions, particularly those that are not remote. A similar result is found for rural regions, while no interaction effect between tourism and KIA entrepreneurship is found for urban regions, supporting the idea that amenity-based non-urban regions may attract both people and economic activity (Naldi et al., 2015, 2021).

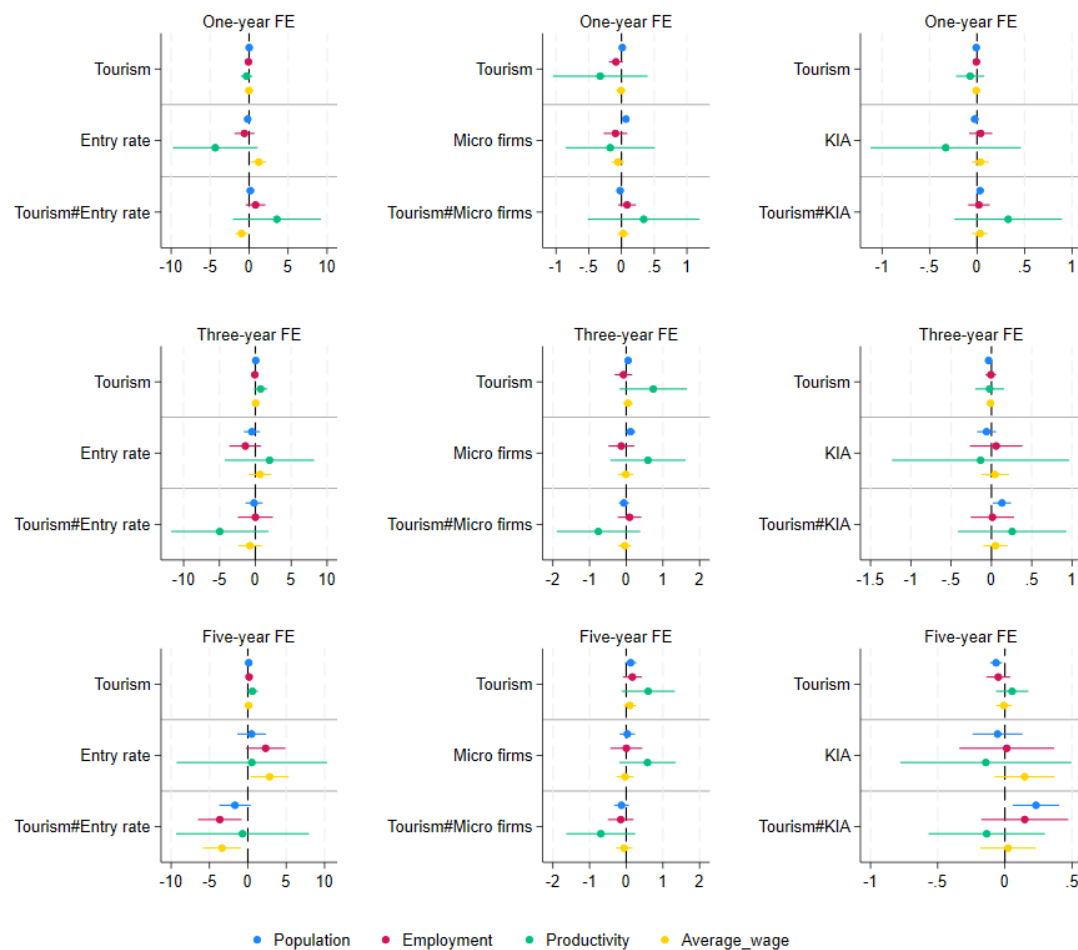


Figure 11. Interaction between entrepreneurship indicators and tourism intensity. Micropolitan regions.

In contrast, the interaction between entry rates and tourism intensity reveals a negative relationship with wage growth over longer horizons. While entry rates alone are positively associated with wage growth, this effect is reversed in more tourism-intensive regions, indicating that new firm formation in the tourism sector is linked to relatively lower wages. A similar negative interaction effect is observed for five-year employment growth, suggesting that tourism-based entrepreneurial dynamics may be less conducive to sustained labor market expansion. No significant interaction effects are observed between micro firms and tourism intensity, and the positive association between micro firms and annual population growth remains unchanged, reinforcing the interpretation that small-scale entrepreneurship primarily supports the extensive margin of growth in micropolitan regions.

Overall, these results reinforce the conclusion that the effects of entrepreneurship in micropolitan regions are strongly conditioned by local characteristics, with remoteness and tourism specialization shaping both the magnitude and nature of those effects.

4.4 Robustness checks

As a robustness check, we estimate dynamic panel models using system GMM (Arellano & Bond, 1991; Blundell & Bond, 1998), treating both the lagged dependent variable and the entrepreneurship measures as endogenous and instrumented using deeper lags, estimated with the two-step heteroskedasticity-robust estimator with Windmeijer's (2005) correction. Instrument sets are restricted and adjusted across specifications to avoid overfitting. While most models pass standard diagnostic tests including AR(2) and Hansen tests, the results show some sensitivity to specification choices, consistent with previous studies highlighting the potential instability of System GMM in panels with limited time dimensions or heterogeneous persistence (Bun & Windmeijer, 2010; Roodman, 2009b).

Tables 7 and 8 report GMM estimates for all regions and the micropolitan subsample respectively; estimates for urban and rural regions are insignificant throughout and not displayed. Overall, the GMM estimates broadly support the main findings: the positive association between micro firms and population growth is confirmed, with some evidence of a positive relationship with employment growth driven primarily by micropolitan regions. For urban regions, estimates display similar negative signs as in the FE models but are imprecisely estimated, reflecting the limited reliability of GMM in smaller subsamples where the number of instruments approaches the number of groups (Roodman, 2009b). For knowledge-intensive entrepreneurship, GMM indicates a positive association with wage growth consistent with the baseline, though diagnostics point to remaining serial correlation and rejection of the instrument set, suggesting caution in interpretation. Taken together, the GMM results are broadly consistent with the baseline findings but sensitive to specification choices, and are accordingly used as robustness checks rather than as the basis for the main analysis.

Table 7. Relationship between entrepreneurship and one-year regional growth, 2007-2023. All regions.

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

Table 8. Relationship between entrepreneurship and one-year regional growth, 2007-2023. Micropolitan regions.

	Population System GMM	Employment System GMM	Productivity System GMM	Average wage System GMM
ln Y	0.0125 (0.0194)	0.0336 (0.0776)	-0.9251 (0.9991)	0.2241 (0.2440)
Entry rate	-0.3876 (0.6713)	3.5366 (5.4785)	24.8330 (57.84)	6.5242 (6.2099)
Micro firms	0.2383*** (0.0519)	0.5712 (0.7895)	-1.6843 (18.33)	-0.9315 (0.8278)
LQ tourism	-0.0018 (0.0054)	-0.0158 (0.0337)	0.1673 (1.3662)	0.0234 (0.0269)
LQ mining	0.0001 (0.0001)	0.0003 (0.0017)	-0.0106 (0.0233)	-0.0017 (0.0017)
LQ manu- facturing	0.0048* (0.0025)	0.0215 (0.0194)	0.1807 (1.3262)	-0.0133 (0.0177)
Highly educated	0.0229 (0.0652)	0.2891 (0.7646)	2.2563 (42.9553)	-0.3470 (0.3321)
Age 15-29	0.2302 (0.3949)	-1.7036 (2.5401)	-22.26 (106.9)	-1.2908 (2.7932)
Age 65+	0.0532 (0.0680)	-1.1366 (1.0947)	-15.0459 (20.39)	-1.4182 (1.1097)
Population density (ln)		-0.0198 (0.0347)	-0.4934 (1.4402)	-0.0228 (0.0222)
Capital intensity (ln)	0.0054** (0.0024)	0.0239 (0.0285)	0.2498 (0.8988)	-0.0325 (0.0324)
Employment rate	-0.0139 (0.0296)	-1.0906* (0.5946)	-4.1314 (7.3467)	0.0386 (0.4355)
Remote	-0.0030 (0.0020)	0.0062 (0.0209)	-0.0622 (0.4133)	-0.0059 (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.

5. Conclusions

This paper examines the role of entrepreneurship in shaping regional growth across Sweden's urban–rural spectrum, with a particular focus on micropolitan regions. Using longitudinal data for all 290 Swedish municipalities over 2007–2023 and dynamic panel models, we show that entrepreneurship matters for regional growth, but in ways that are strongly conditioned by place. In micropolitan regions, a higher share of micro firms is robustly associated with population growth, indicating that small-scale entrepreneurship primarily supports demographic expansion rather than structural upgrading. Entry rates show limited short-run effects and even negative associations with longer-term population and employment growth, while knowledge-intensive entrepreneurship exhibits more nuanced effects, contributing to wage and population growth over longer horizons but without consistent productivity gains.

Comparing across the spatial hierarchy reveals clear differences. In urban regions, micro firms are negatively associated with several growth outcomes while human capital emerges as the key

predictor of productivity and wage growth. Rural regions resemble micropolitan areas in their reliance on micro firms for extensive growth, but differ in that entry rates contribute positively to employment growth. These contrasts highlight that entrepreneurship does not operate uniformly across space but interacts with local economic structures, labor markets, and sectoral specializations.

The findings call for a reconsideration of how regional development is conceptualized. Rather than being treated as residual categories, micropolitan regions should be understood as distinct spaces with their own development logics, where entrepreneurship plays a stabilizing role – supporting demographic and labor-market dynamics rather than driving structural transformation. Policies targeting micropolitan growth should therefore account for the type and function of entrepreneurship across places: supporting small-scale embedded firms may aid population retention and employment, but stimulating productivity growth requires a stronger focus on knowledge-intensive activities, connectivity, and sectoral upgrading (cf. Eliasson and Westlund (2013)). Firm-level analyses, sectoral studies, and cross-country comparisons represent promising avenues for future research.

References

- Amit, R., & Muller, E. (1995). “Push” and “pull” entrepreneurship. *Journal of Small Business & Entrepreneurship*, 12(4), 64-80.
- Andersson, M., & Larsson, J. P. (2022). Historical local industry structure, voting patterns and the long-run entrepreneurial character of regions: Swedish examples. *The annals of regional science*, 69(3), 611-631.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, 58(2), 277-297.
- Audretsch, D. B., Belitski, M., & Desai, S. (2015). Entrepreneurship and economic development in cities. *The annals of regional science*, 55(1), 33-60.
- Audretsch, D. B., & Fritsch, M. (2002). Growth Regimes over Time and Space. *Regional Studies*, 36(2), 113-124.
- Bignall, N. M., & Debbage, K. G. (2023). Non-farm proprietorship employment by micropolitan county. *Journal of Enterprising Communities: People and Places in the Global Economy*, 17(3), 728-748.
- Birkner, Z., Máhr, T., Péter, E., & Berkes, N. R. (2018). Characteristics of innovation in regions with small-and medium-sized towns. *Naše gospodarstvo/Our economy*, 64(2), 34-42.
- Bjarnason, T., Stockdale, A., Shuttleworth, I., Eimermann, M., & Shucksmith, M. (2021). At the intersection of urbanisation and counterurbanisation in rural space: Microurbanisation in Northern Iceland. *Journal of Rural Studies*, 87, 404-414.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.

- Bond, G., Ryan, P., & Buciuni, G. (2026). Rural entrepreneurial ecosystems: Mapping an emerging field and setting a research agenda. *Journal of Rural Studies*, 124, 104105.
- Brown, D. L., Cromartie, J. B., & Kulcsar, L. J. (2004). Micropolitan Areas and the Measurement of American Urbanization. *Population Research and Policy Review*, 23(4), 399-418.
- Bruno, G. S. (2005). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics Letters*, 87(3), 361-366.
- Bun, M. J., & Windmeijer, F. (2010). The weak instrument problem of the system GMM estimator in dynamic panel data models. *The Econometrics Journal*, 13(1), 95-126.
- Davidsson, M., & Rickman, D. S. (2011). US micropolitan area growth: A spatial equilibrium growth analysis. *Review of Regional Studies*, 41(2, 3), 179-203.
- Delfmann, H., & Koster, S. (2016). The effect of new business creation on employment growth in regions facing population decline. *The annals of regional science*, 56(1), 33-54.
- Dijkstra, L., Garcilazo, E., & McCann, P. (2013). The economic performance of European cities and city regions: Myths and realities. *European Planning Studies*, 21(3), 334-354.
- Duranton, G., & Puga, D. (2004). Micro-foundations of urban agglomeration economies. In J. V. Henderson & J.-F. Thisse (Eds.), *Handbook of Regional and Urban Economics, Volume 4: Cities and Geography* (Vol. Volume 4, pp. 2063-2117). Elsevier. [https://doi.org/http://dx.doi.org/10.1016/S1574-0080\(04\)80005-1](https://doi.org/http://dx.doi.org/10.1016/S1574-0080(04)80005-1)
- Eliasson, K., & Westlund, H. (2013). Attributes influencing self-employment propensity in urban and rural Sweden. *The annals of regional science*, 50(2), 479-514.
- Florida, R. (2002). *The Rise of the Creative Class: And how it is Transforming Work, Leisure, Community and Everyday Life*. Basic Books.
- Florida, R., Adler, P., & Mellander, C. (2018). The city as innovation machine. In *Transitions in regional economic development* (pp. 151-170). Routledge.
- Foster, S. R., & Gillette, C. P. (2023). Can micropolitan areas bridge the urban-rural divide? *Theoretical Inquiries in Law*, 24(2), 93-117.
- Fritsch, M., & Wyrwich, M. (2017). The effect of entrepreneurship on economic development—an empirical analysis using regional entrepreneurship culture. *Journal of Economic Geography*, 17(1), 157-189.
- Glaeser, E. (2011). *Triumph of the city: How our greatest invention makes us richer, smarter, greener, healthier, and happier*. The Penguin Press.
- Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., & Shleifer, A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126-1152.
- Greenberg, Z., Farja, Y., & Gimmon, E. (2018). Embeddedness and growth of small businesses in rural regions. *Journal of Rural Studies*, 62, 174-182.
- Judson, R. A., & Owen, A. L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics Letters*, 65(1), 9-15.

- Keeble, D., & Tyler, P. (1995). Enterprising behaviour and the urban-rural shift. *Urban Studies*, 32(6), 975-997.
- Laurin, F., Pronovost, S., & Carrier, M. (2020). The end of the urban-rural dichotomy? Towards a new regional typology for SME performance. *Journal of Rural Studies*, 80, 53-75.
- Liu, S., Qian, H., & Haynes, K. E. (2021). Entrepreneurship in Small Cities: Evidence From U.S. Micropolitan Areas. *Economic Development Quarterly*, 35(1), 3-21.
- Mankiw, G. N., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2), 407-437.
- McFarland, C. K., & Grabowski, E. H. (2022). Local employment impacts of connectivity to regional economies: The role of industry clusters in bridging the urban-rural divide. *Economic Development Quarterly*, 36(3), 317-328.
- Mincer, J. (1984). Human capital and economic growth. *Economics of Education Review*, 3(3), 195-205.
- Mincer, J. A. (1974). *Schooling, experience, and earnings*. Columbia University Press.
- Mulligan, G. F., & Vias, A. C. (2006). Growth and change in US micropolitan areas. *The annals of regional science*, 40(2), 203-228.
- Naldi, L., Nilsson, P., Westlund, H., & Wixe, S. (2015). What is smart rural development? *Journal of Rural Studies*, 40(0), 90-101.
- Naldi, L., Nilsson, P., Westlund, H., & Wixe, S. (2021). Amenities and new firm formation in rural areas. *Journal of Rural Studies*, 85, 32-42.
- Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica: Journal of the econometric society*, 1417-1426.
- North, D., & Smallbone, D. (2000). The innovativeness and growth of rural SMEs during the 1990s. *Regional Studies*, 34(2), 145-157.
- Partridge, M. D., Rickman, D. S., Ali, K., & Olfert, M. R. (2008). Lost in space: population growth in the American hinterlands and small cities. *Journal of Economic Geography*, 8(6), 727-757.
- Roberts, B., & Hohmann, R. P. (2014). *The Systems of Secondary Cities: The neglected drivers of urbanising economies* (CIVIS Sharing Knowledge and Learning from Cities, Issue. [Record #1461 is using a reference type undefined in this output style.]
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2), S71-S102.
- Roodman, D. (2009a). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, 9(1), 86-136.
- Roodman, D. (2009b). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1), 135-158.
- Rosenthal, S. S., & Strange, W. C. (2004). Evidence on the nature and sources of agglomeration economies. In *Handbook of regional and urban economics* (Vol. 4, pp. 2119-2171). Elsevier.

- Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65-94.
- Stam, E. (2010). Entrepreneurship, evolution and geography. *The handbook of evolutionary economic geography*, 307-348.
- Stam, E., & Wennberg, K. (2009). The roles of R&D in new firm growth. *Small Business Economics*, 33(1), 77-89.
- Vaessen, P., & Keeble, D. (1995). Growth-oriented SMEs in unfavourable regional environments. *Regional Studies*, 29(6), 489-505.
- Vias, A. C. (2012a). Micropolitan areas and urbanization processes in the US. *Cities*, 29, S24-S28.
- Vias, A. C. (2012b). Perspectives on US rural labor markets in the first decade of the twenty-first century. In *International Handbook of Rural Demography* (pp. 273-291). Springer.
- Vias, A. C., Mulligan, G. F., & Molin, A. (2002). Economic structure and socioeconomic change in America's micropolitan areas, 1970–1997. *The Social Science Journal*, 39(3), 399-417.
- Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25-51.

Statistics Sweden. 2025. Statistikdatabasen,

Population:

https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START_BE_BE0101_BE0101A/BefolkningCKM/, accessed 090426

Land area:

https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START_MI_MI0802/Areal2025/, accessed 090426

United States Census Bureau 2025.

Metropolitan and Micropolitan Statistical Area Population Totals and Components of Change: 2020-2025. <https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-metro-and-micro-statistical-areas.html>, accessed 090426

Gazetteer Files (land area): <https://www.census.gov/geographies/reference-files/time-series/geo/gazetteer-files.html>, accessed 090426

Delineation Files: <https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html>, accessed 090426

Electronic supplementary material

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

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 outcome variables

Table C1. Descriptive statistics on outcome variables in levels averaged over 2007-2023 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Urban</i>					
Population	646	124,192	160,753	15,065	988,943
Employment	646	67,837	113,147	2,718	749,060
Productivity	646	946,243	192,553	600,394	1,908,897
Average wage	646	353,939	42,535	254,835	544,634
<i>Micropolitan</i>					
Population	1,649	36,533	19,074	11,126	105,796
Employment	1,649	15,919	10,211	4,048	54,709
Productivity	1,649	828,039	187,413	381,968	2,729,187
Average wage	1,649	318,554	28,430	245,407	446,797
<i>Rural</i>					
Population	2,635	10,468	4,451	2,339	26,575
Employment	2,635	4,109	1,924	729	10,672
Productivity	2,635	772,727	211,251	343,948	3,194,729
Average wage	2,635	289,712	26,288	211,779	418,765

Notes: Productivity and average wages are measured in real 2020 terms, adjusted for inflation using the national CPIF. Observations refer to year-municipality.

Table C2. Descriptive statistics on outcome variables in levels averaged over 2007-2023 per close and remote micropolitan and rural regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Micropolitan close</i>					
Population	1,207	36,656	19,445	11,126	105,796
Employment	1,207	15,458	10,571	4,048	54,709
Productivity	1,207	817,865	140,061	567,872	1,901,349
Average wage	1,207	317,844	28,667	245,407	446,797
<i>Micropolitan remote</i>					
Population	442	36,198	18,041	12,183	86,738
Employment	442	17,176	9,049	6,267	42,488
Productivity	442	855,820	276,680	381,968	2,729,187
Average wage	442	320,496	27,711	259,612	414,721
<i>Rural close</i>					
Population	1,428	11,146	4,354	2,348	26,575
Employment	1,428	4,148	1,890	729	10,672
Productivity	1,428	763,933	175,013	486,714	3,191,044
Average wage	1,428	290,729	27,874	211,779	418,765
<i>Rural remote</i>					
Population	1,207	9,667	4,432	2,339	20,679
Employment	1,207	4,063	1,964	1,012	8,828
Productivity	1,207	783,132	247,035	343,948	3,194,729
Average wage	1,207	288,509	24,235	218,102	382,631

Notes: Productivity and average wages are measured in real 2020 terms, adjusted for inflation using the national CPIF. Observations refer to year-municipality.

Appendix D – Descriptive statistics for entrepreneurship variables

Table D1. Descriptive statistics on entrepreneurship variables averaged over 2007-2022 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Urban</i>					
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
<i>Micropolitan</i>					
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
<i>Rural</i>					
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 D2. Descriptive statistics on entrepreneurship variables averaged over 2007-2022 per close and remote non-urban regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Micropolitan close</i>					
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
<i>Micropolitan remote</i>					
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
<i>Rural close</i>					
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
<i>Rural remote</i>					
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.

Appendix E – Descriptive statistics for control variables

Table E1. Descriptive statistics for control variables averaged over 2007-2022 per municipality type; urban, micropolitan, rural.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Urban</i>					
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
<i>Micropolitan</i>					
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
<i>Rural</i>					
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 E2. Descriptive statistics for control variables averaged over 2007-2022 per close and remote non-urban regions.

Variable	Obs.	Mean	Std. dev.	Min	Max
<i>Micropolitan close</i>					
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
<i>Micropolitan remote</i>					
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
<i>Rural close</i>					
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
<i>Rural remote</i>					
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 E3. 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 F – Panel descriptive statistics

Table F1. Panel summary statistics for outcome and explanatory variables.

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 G – Estimations for three- and five-year growth

Table G1. Relationship between entrepreneurship and three-year regional growth, 2007-2023. All regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0020 (0.0016)	-0.0668*** (0.0250)	0.0027 (0.0020)	-0.6166*** (0.0372)	-0.2656*** (0.0418)	-0.9431*** (0.0322)	-0.0592*** (0.0154)	-0.6789*** (0.0311)
Entry rate	-0.1418 (0.1677)	-0.1280 (0.1021)	-0.3559 (0.2846)	-0.0564 (0.2610)	3.6887*** (0.7186)	0.7226 (0.6604)	0.3657** (0.1603)	0.3156* (0.1868)
Micro firms	0.0607*** (0.0164)	0.0286 (0.0397)	0.1008*** (0.0342)	-0.0386 (0.1005)	-0.1483* (0.0823)	-0.3793* (0.2144)	-0.0218 (0.0198)	-0.0456 (0.0573)
LQ tourism	0.0060*** (0.0011)	-0.0024 (0.0037)	0.0036** (0.0018)	0.0018 (0.0063)	0.0010 (0.0064)	-0.0134 (0.0133)	0.0025** (0.0011)	-0.0072* (0.0040)
LQ mining	-0.0001** (0.0000)	-0.0002 (0.0002)	0.0001 (0.0001)	-0.0016** (0.0007)	0.0021*** (0.0005)	0.0047** (0.0019)	0.0003*** (0.0000)	-0.0000 (0.0004)
LQ manu- facturing	-0.0004 (0.0009)	0.0016 (0.0022)	-0.0036** (0.0016)	0.0069 (0.0078)	0.0150*** (0.0044)	0.0101 (0.0136)	0.0010 (0.0009)	0.0067* (0.0040)
Highly educated	-0.0217 (0.0180)	0.1726* (0.0949)	0.0451 (0.0288)	0.5191** (0.2060)	0.1224** (0.0510)	0.0124 (0.5062)	0.0247* (0.0129)	0.3329*** (0.1237)
Age 15-29	0.0947* (0.0509)	-0.2983*** (0.0954)	0.0348 (0.1000)	-0.1731 (0.2097)	0.1716 (0.1727)	-0.3885 (0.4731)	0.0232 (0.0402)	0.1897 (0.1383)
Age 65+	-0.1678*** (0.0307)	0.3440*** (0.0791)	-0.2267*** (0.0477)	-0.1438 (0.1571)	-0.1535 (0.1170)	0.0038 (0.3376)	-0.0160 (0.0245)	0.3911*** (0.0959)
Population density (ln)	0.0049*** (0.0009)		0.0001 (0.0013)	0.4355*** (0.0586)	0.0094* (0.0050)	-0.1592 (0.1191)	0.0029*** (0.0008)	0.0312 (0.0295)
Capital intensity (ln)	0.0015 (0.0014)	-0.0004 (0.0019)	-0.0006 (0.0025)	0.0049 (0.0053)	0.0493*** (0.0090)	-0.0020 (0.0111)	0.0032** (0.0014)	0.0016 (0.0027)
Employment rate	0.0925*** (0.0171)	0.0123 (0.0359)	-0.0115 (0.0310)	-0.0154 (0.0949)	0.1374** (0.0643)	-0.2117 (0.2424)	0.0495** (0.0198)	0.0739 (0.0527)
<i>Region type</i>								
Micropolitan close	-0.0020 (0.0030)		-0.0037 (0.0054)		-0.0064 (0.0093)		0.0017 (0.0020)	
Micropolitan remote	-0.0080** (0.0032)		-0.0082 (0.0058)		-0.0021 (0.0114)		0.0013 (0.0023)	
Rural close	-0.0043 (0.0045)		-0.0056 (0.0073)		-0.0224 (0.0143)		-0.0017 (0.0029)	
Rural remote	-0.0112** (0.0046)		-0.0068 (0.0078)		-0.0119 (0.0134)		0.0009 (0.0030)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R ²	0.6594	0.4281	0.3417	0.5038	0.1913	0.5164	0.5953	0.7374
F-stat	74.80***	43.39***	75.44***	150.4***	18.20***	103.3***	225.6***	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 G2. Relationship between entrepreneurship and five-year regional growth, 2007-2023. All regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0029 (0.0027)	-0.1667*** (0.0416)	0.0046 (0.0034)	-0.9397*** (0.0452)	-0.3386*** (0.0469)	-1.0685*** (0.0276)	-0.0685*** (0.0254)	-0.8687*** (0.0398)
Entry rate	-0.4261 (0.3129)	-0.3080** (0.1553)	-0.6978 (0.4649)	-0.4653 (0.3679)	5.1249*** (1.0409)	0.7739 (0.7781)	0.4315** (0.2096)	-0.0045 (0.1929)
Micro firms	0.0960*** (0.0271)	-0.0380 (0.0573)	0.1676*** (0.0570)	-0.1141 (0.1171)	-0.1465 (0.1087)	-0.2247 (0.2312)	-0.0039 (0.0323)	-0.0121 (0.0610)
LQ tourism	0.0099*** (0.0020)	-0.0086 (0.0062)	0.0037 (0.0028)	-0.0037 (0.0097)	0.0016 (0.0086)	-0.0048 (0.0185)	0.0047*** (0.0017)	-0.0118* (0.0061)
LQ mining	-0.0001** (0.0001)	-0.0002 (0.0002)	0.0001 (0.0002)	-0.0010 (0.0007)	0.0026*** (0.0005)	0.0022 (0.0026)	0.0004*** (0.0001)	-0.0007 (0.0006)
LQ manu- facturing	-0.0006 (0.0015)	0.0017 (0.0036)	-0.0059** (0.0027)	0.0185** (0.0092)	0.0207*** (0.0059)	-0.0023 (0.0142)	0.0002 (0.0015)	-0.0041 (0.0055)
Highly educated	-0.0380 (0.0300)	0.3864** (0.1547)	0.0705 (0.0483)	0.8846*** (0.2854)	0.1476** (0.0733)	-0.1971 (0.5227)	0.0331 (0.0207)	0.3783** (0.1604)
Age 15-29	0.1678* (0.0865)	-0.6777*** (0.1507)	0.1336 (0.1694)	-0.4845 (0.3000)	0.5197** (0.2368)	-0.0619 (0.5865)	-0.0021 (0.0599)	0.1243 (0.1615)
Age 65+	-0.2778*** (0.0535)	0.5846*** (0.1297)	-0.3502*** (0.0815)	-0.0409 (0.2350)	-0.1643 (0.1624)	-0.1268 (0.3424)	-0.0459 (0.0370)	0.5431*** (0.1318)
Population density (ln)	0.0083*** (0.0015)		0.0007 (0.0022)	0.6134*** (0.0869)	0.0141** (0.0063)	-0.3088** (0.1318)	0.0038*** (0.0012)	0.0286 (0.0411)
Capital intensity (ln)	0.0021 (0.0024)	-0.0022 (0.0026)	-0.0005 (0.0040)	0.0059 (0.0063)	0.0548*** (0.0104)	0.0115 (0.0113)	0.0040* (0.0023)	0.0033 (0.0031)
Employment rate	0.1463*** (0.0289)	0.0406 (0.0573)	-0.0046 (0.0524)	0.1285 (0.1221)	0.2013** (0.0899)	0.1214 (0.2520)	0.0609** (0.0283)	0.0595 (0.0624)
<i>Region type</i>								
Micropolitan close	-0.0038 (0.0049)		-0.0051 (0.0089)		-0.0065 (0.0130)		0.0039 (0.0032)	
Micropolitan remote	-0.0137** (0.0054)		-0.0141 (0.0093)		0.0007 (0.0157)		0.0041 (0.0036)	
Rural close	-0.0066 (0.0075)		-0.0073 (0.0121)		-0.0253 (0.0192)		-0.0007 (0.0046)	
Rural remote	-0.0184** (0.0077)		-0.0087 (0.0128)		-0.0129 (0.0184)		0.0044 (0.0046)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R ²	0.7041	0.5084	0.3217	0.5319	0.2570	0.6069	0.6468	0.8206
F-stat	79.64***	45.95***	61.83***	124.9***	17.88***	128.9***	232.1***	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 G3. Relationship between entrepreneurship and three-year regional growth, 2007-2023. Micropolitan regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0018 (0.0023)	-0.0333 (0.0408)	0.0058 (0.0039)	-0.6434*** (0.0677)	-0.3710*** (0.0710)	-0.9662*** (0.0477)	-0.0285 (0.0346)	-0.6068*** (0.0647)
Entry rate	-0.2609 (0.2979)	-0.6643*** (0.2426)	-1.5690** (0.7103)	-1.3504** (0.6103)	0.8485 (1.6041)	-2.5890 (1.7155)	0.1209 (0.3870)	-0.0042 (0.4276)
Micro firms	0.1089*** (0.0229)	0.0671 (0.0602)	0.1502*** (0.0477)	-0.0616 (0.1601)	-0.0109 (0.1259)	-0.0123 (0.3279)	0.0065 (0.0347)	-0.0458 (0.0816)
LQ tourism	0.0071*** (0.0022)	-0.0033 (0.0050)	0.0153** (0.0059)	-0.0020 (0.0146)	0.0325 (0.0214)	0.0422 (0.0392)	0.0043 (0.0027)	0.0030 (0.0068)
LQ mining	-0.0000 (0.0001)	0.0001 (0.0004)	0.0000 (0.0001)	-0.0014*** (0.0005)	0.0027*** (0.0005)	0.0126*** (0.0025)	0.0002*** (0.0001)	0.0028*** (0.0005)
LQ manu- facturing	0.0003 (0.0012)	0.0020 (0.0044)	-0.0048* (0.0025)	-0.0156 (0.0164)	0.0313*** (0.0087)	0.0030 (0.0256)	0.0007 (0.0018)	0.0096 (0.0067)
Highly educated	0.0145 (0.0196)	0.1742* (0.0956)	0.0294 (0.0377)	0.5969** (0.2654)	0.2802** (0.1199)	0.7550 (1.0977)	0.0338 (0.0280)	0.4538* (0.2329)
Age 15-29	0.2581*** (0.0692)	-0.3325** (0.1378)	0.0659 (0.1706)	-0.5953 (0.3796)	-0.1873 (0.3202)	0.5788 (0.8908)	-0.0139 (0.0655)	0.0126 (0.2224)
Age 65+	-0.0069 (0.0306)	0.5668*** (0.1262)	-0.1433** (0.0655)	0.2341 (0.2641)	-0.4503* (0.2269)	-0.5304 (0.9351)	-0.0355 (0.0332)	0.8275*** (0.1947)
Population density (ln)	0.0062*** (0.0010)		0.0013 (0.0020)	0.3841*** (0.0954)	-0.0057 (0.0087)	-0.4362* (0.2410)	0.0013 (0.0014)	0.1849*** (0.0573)
Capital intensity (ln)	0.0015 (0.0021)	-0.0013 (0.0037)	-0.0016 (0.0039)	0.0104 (0.0094)	0.0414*** (0.0157)	-0.0073 (0.0297)	-0.0010 (0.0025)	0.0099 (0.0071)
Employment rate	0.1221*** (0.0220)	-0.0770 (0.0586)	0.0920* (0.0508)	0.0251 (0.1607)	0.0337 (0.1383)	-1.0301** (0.5065)	0.0735** (0.0286)	-0.1511 (0.0977)
Remote	-0.0066*** (0.0016)		-0.0027 (0.0027)		-0.0011 (0.0094)		0.0006 (0.0015)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R ²	0.5997	0.4259	0.3932	0.5831	0.2426	0.5393	0.7077	0.8135
F-stat	120.4***	24.54***	47.79***	104.2***	14.88***	55.66***	179.1***	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 G4. Relationship between entrepreneurship and five-year regional growth, 2007-2023. Micropolitan regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0021 (0.0037)	-0.1619** (0.0755)	0.0099 (0.0062)	-0.9558*** (0.0866)	-0.4649*** (0.0931)	-1.0953*** (0.0607)	-0.0189 (0.0609)	-0.7780*** (0.0828)
Entry rate	-0.5427 (0.5048)	-0.9997*** (0.3571)	-1.7878 (1.1034)	-0.8942 (0.6669)	2.0745 (2.3221)	-0.3414 (2.3403)	0.3725 (0.6555)	-0.0527 (0.4758)
Micro firms	0.1694*** (0.0378)	-0.0726 (0.0894)	0.2213*** (0.0770)	-0.1118 (0.1706)	0.0178 (0.1759)	0.0217 (0.5088)	0.0134 (0.0604)	-0.0811 (0.1016)
LQ tourism	0.0122*** (0.0038)	-0.0078 (0.0092)	0.0225** (0.0094)	-0.0103 (0.0203)	0.0400 (0.0267)	0.0229 (0.0264)	0.0072 (0.0052)	0.0005 (0.0104)
LQ mining	-0.0001 (0.0001)	-0.0001 (0.0005)	0.0000 (0.0002)	-0.0023*** (0.0008)	0.0033*** (0.0007)	0.0138*** (0.0024)	0.0004** (0.0001)	0.0037*** (0.0008)
LQ manu- facturing	0.0004 (0.0019)	0.0034 (0.0062)	-0.0064* (0.0038)	-0.0117 (0.0139)	0.0425*** (0.0117)	0.0012 (0.0311)	-0.0001 (0.0032)	-0.0028 (0.0073)
Highly educated	0.0231 (0.0331)	0.4023** (0.1793)	0.0475 (0.0585)	0.9063** (0.3591)	0.3681** (0.1612)	0.7329 (1.1822)	0.0237 (0.0488)	0.6782** (0.3035)
Age 15-29	0.4405*** (0.1149)	-0.7062*** (0.2105)	0.1799 (0.2724)	-1.0837* (0.5594)	0.3074 (0.3944)	1.4596 (0.9160)	-0.0298 (0.1072)	0.0979 (0.2668)
Age 65+	0.0069 (0.0516)	0.9304*** (0.2025)	-0.2190** (0.0974)	0.6488* (0.3896)	-0.3840 (0.2882)	-0.7429 (0.9366)	-0.0592 (0.0600)	1.0498*** (0.2660)
Population density (ln)	0.0102*** (0.0017)		0.0032 (0.0030)	0.5248*** (0.1354)	-0.0034 (0.0119)	-0.6116** (0.2728)	0.0031 (0.0022)	0.2052** (0.0813)
Capital intensity (ln)	0.0015 (0.0034)	-0.0059 (0.0055)	-0.0028 (0.0060)	0.0107 (0.0113)	0.0491*** (0.0181)	-0.0100 (0.0288)	-0.0046 (0.0041)	0.0088 (0.0067)
Employment rate	0.2173*** (0.0367)	-0.0589 (0.0881)	0.1500* (0.0799)	0.1011 (0.1855)	0.2117 (0.1671)	-0.2621 (0.3953)	0.1429*** (0.0453)	-0.1655 (0.1116)
Remote	-0.0114*** (0.0026)		-0.0066 (0.0042)		-0.0018 (0.0123)		0.0017 (0.0024)	
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R ²	0.6491	0.5089	0.3569	0.6163	0.3187	0.6392	0.7487	0.8796
F-stat	112***	31.04***	37.85***	96.17***	19.40***	105.2***	204.9***	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 G5. Relationship between entrepreneurship and three-year regional growth, 2007-2023. Urban regions.

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

Table G6. Relationship between entrepreneurship and five-year regional growth, 2007-2023. Urban regions.

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

Table G7. Relationship between entrepreneurship and three-year regional growth, 2007-2023. Rural regions.

	Population		Employment		Productivity		Average wage	
	POLS	FE	POLS	FE	POLS	FE	POLS	FE
ln Y	0.0043** (0.0020)	-0.0899** (0.0381)	-0.0006 (0.0034)	-0.6615*** (0.0477)	-0.2572*** (0.0517)	-0.9600*** (0.0438)	-0.0706*** (0.0194)	-0.7340*** (0.0401)
Entry rate	0.0693 (0.1487)	-0.0981 (0.1063)	-0.1294 (0.3125)	0.2638 (0.2913)	4.3756*** (1.0115)	0.5082 (0.7556)	0.5260** (0.2249)	0.3785* (0.2153)
Micro firms	0.0337 (0.0210)	0.0122 (0.0511)	0.1492*** (0.0492)	-0.0410 (0.1304)	-0.3729** (0.1439)	-0.3734 (0.2698)	-0.0770** (0.0344)	-0.0985 (0.0763)
LQ tourism	0.0049*** (0.0011)	-0.0002 (0.0040)	0.0036* (0.0019)	0.0032 (0.0072)	-0.0029 (0.0061)	-0.0236 (0.0161)	0.0033*** (0.0012)	-0.0090** (0.0040)
LQ mining	0.0001 (0.0001)	-0.0002 (0.0003)	0.0003 (0.0004)	-0.0015* (0.0008)	0.0010 (0.0007)	0.0020 (0.0020)	0.0002 (0.0001)	-0.0004 (0.0002)
LQ manu- facturing	0.0006 (0.0012)	0.0014 (0.0028)	-0.0006 (0.0023)	0.0184** (0.0091)	0.0051 (0.0047)	0.0089 (0.0162)	0.0003 (0.0012)	0.0050 (0.0051)
Highly educated	0.0435 (0.0521)	0.4778*** (0.1438)	0.1356* (0.0814)	0.4519* (0.2531)	0.1060 (0.1848)	-0.5318 (0.5572)	-0.0078 (0.0372)	0.0459 (0.1628)
Age 15-29	-0.0823 (0.0769)	-0.2750** (0.1350)	0.1633 (0.1902)	0.2674 (0.2582)	0.1048 (0.3749)	-0.2844 (0.6296)	-0.0490 (0.0916)	0.1645 (0.1949)
Age 65+	-0.2392*** (0.0344)	0.2325** (0.1032)	-0.2063*** (0.0712)	0.0210 (0.1974)	-0.1433 (0.1617)	0.3773 (0.3960)	-0.0370 (0.0388)	0.2351* (0.1299)
Population density (ln)	0.0043*** (0.0011)		-0.0001 (0.0018)	0.4471*** (0.0698)	0.0163** (0.0072)	-0.0038 (0.1463)	0.0042*** (0.0010)	0.0926** (0.0435)
Capital intensity (ln)	0.0003 (0.0018)	0.0005 (0.0026)	-0.0020 (0.0034)	0.0007 (0.0057)	0.0640*** (0.0126)	-0.0008 (0.0135)	0.0041** (0.0018)	0.0002 (0.0034)
Employment rate	0.0672** (0.0261)	0.0375 (0.0492)	-0.0808* (0.0474)	-0.0976 (0.1304)	0.2174** (0.0942)	0.1165 (0.2901)	0.0552 (0.0337)	0.1979*** (0.0681)
Remote	-0.0057*** (0.0015)		-0.0008 (0.0033)		0.0084 (0.0076)			
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	NO	YES	NO	YES	NO	YES	NO	YES
R ²	0.6200	0.4962	0.2899	0.5489	0.2040	0.5243	0.5448	0.7115
F-stat	48.66***	34.26***	39.75***	88.09***	14.46***	93.23***	127.9***	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 G8. Relationship between entrepreneurship and five-year regional growth, 2007-2023. Rural regions.

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