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DETERMINANTS OF ENTREPRENEURIAL ACTIVITY IN THE PERIPHERY: A MICRO SPATIAL PERSPECTIVE

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Purpose: The paper aims to identify the extent to which the determinants of entrepreneurial activity differ at the micro spatial level in a peripheral region.
Design/methodology/approach: Based on a sample of 71 micro spatial NUTS-5 units (municipalities) that constitute the peripheral region, the Opolskie Voivodeship, Poland, we applied Hellwig's linear ordering method to test the research hypothesis. Data from the Local Data Bank of the Polish Central Statistical Office for the years 2015, 2020 and 2022 were used.
Findings: This study demonstrates that while the determinants of entrepreneurial activity in a peripheral region vary at the micro level, their spatial distribution in the Opolskie Voivodeship remains stable. Urban areas offer the most favourable environment for entrepreneurial activity, while rural units show more moderate conditions. Spatial units with the best conditions for entrepreneurship exhibited limited spillover effects to neighbouring areas.
Research limitations/implications: This study has limitations, including a focus on selected years and a limited set of determinants, which may not allow to capture the full range of determinants of entrepreneurial activity at the micro spatial level. Future research could increase robustness by including additional variables, comparing different time periods and using alternative data analysis methods at the micro spatial level.
Practical implications: The results suggest that regional development policies in peripheral regions should focus on improving underperforming micro spatial units while leveraging the strengths of those with better conditions for entrepreneurship. The lack of spillover effects from those units with the most favourable conditions for entrepreneurship to others highlights the need for localised interventions to support entrepreneurship in a more targeted way.
Originality/value: The paper contributes to the recent literature on regional entrepreneurship by focusing on micro spatial units (NUTS-5) in a peripheral region, uncovering spatial patterns that may be overlooked in broader regional studies.
Keywords: entrepreneurial activity, determinants, peripheral region, micro spatial diversity.
Category of the paper: Research paper.

1. Introduction

Entrepreneurial activity is widely recognised as a fundamental driver of economic growth and development (Acs et al., 2007). Previous research has mainly focused on individual-level factors influencing entrepreneurship, such as human capital and entrepreneurial motivations for growth (Huggins et al., 2017), and regional factors, such as economic infrastructure and access to networks (Sternberg, 2022). The role of entrepreneurship is particularly important in peripheral regions, which often face structural challenges such as limited access to financial resources, markets and skilled labour (Naudé et al., 2008; Fritsch, Wyrwich, 2013). However, despite the growing recognition of the importance of entrepreneurship for regional development (Brekke, 2015; Patel, Wolfe, 2023), the spatial diversity of the determinants of entrepreneurial activity in the periphery remains under-researched. This gap is particularly important given that such regions face specific constraints and challenges that differ from those of more developed regions. As a result, there is a need for an extended research into the region-specific factors that influence entrepreneurial behaviour. Recent studies emphasised how local context and regional specificities, including geographical and cultural factors, could strongly affect the entrepreneurial ecosystem (Stam, Welter, 2020). In addition, research showed how spatial variation within regions, related to the degree of agglomeration effect and knowledge spillovers, influences start-up rates in cities in developing countries (Duran, 2023). These findings highlight the need to study entrepreneurship through a spatial lens, since recognizing regional distinctness seems to be essential in shaping entrepreneurial outcomes in a periphery.

Therefore, the aim of the paper is to identify the extent to which the determinants of entrepreneurial activity differ at the micro spatial level in a peripheral region. We tested the research hypothesis using a sample of 71 micro spatial NUTS-5 units (municipalities) located in the peripheral region, Opolskie Voivodeship, Poland. We used Hellwig's linear ordering method to analyse the data. The data were obtained from the Local Data Bank of the Polish Central Statistical Office for the years 2015, 2020 and 2022.

Our research contributes to the literature on entrepreneurship and regional development by providing micro-level evidence on the spatially heterogeneous and persistent nature of entrepreneurial determinants in peripheral regions. We identify a lack of spillover effects between neighbouring units, when one of them is considered to be the most conducive to entrepreneurship, suggesting that local policies, infrastructure, and institutional frameworks play a crucial role in fostering or hindering entrepreneurship at the micro spatial level. These findings may have implications for regional development policies, in particular for the prioritisation of local interventions to promote entrepreneurship.

The remainder of the paper is structured as follows: the next section reviews the literature and develops the research hypothesis. The subsequent sections describe the research methodology, present the results and provide a discussion. Finally, the concluding remarks, limitations and suggestions for future research are presented in the last section.

2. Literature review

The region, or more specifically 'location' as emphasised by Acs et al. (2007), is crucial for entrepreneurial activity because it provides the resources and environmental conditions such as infrastructure, finance, policy, culture and the labour market, that influence entrepreneurial processes (Guerrero et al., 2021). These determinants of entrepreneurial activity are broadly categorised as demand and supply side, institutional and cultural determinants, and agglomeration effects (Bosma et al., 2008).

The demand-side reflects the extent to which there is potential demand for entrepreneurship, as indicated by factors such as per capita income and population density. Peripheral regions often face lower population densities and limited access to wider consumer markets, which limits the demand for goods and services (Duran, 2023). This reduced local demand can make it difficult for entrepreneurs to scale up their businesses (Buratti et al., 2022). Thus, as highlighted by Ross et al. (2015), spatial variation in local demand determinants can affect the need for ongoing entrepreneurship, resulting in regional disparities in this regard.

On the supply side, which reflects the extent to which a region has a latent entrepreneurial workforce, several determinants influence entrepreneurial activity. These include unemployment and human capital. The local unemployment rate serves as a key indicator of regional economic distress, reflecting the overall health of local businesses (Acs et al., 2007). When economic conditions worsen, latent entrepreneurial aspirations are often triggered, pushing individuals towards self-employment as a response to reduced employment opportunities (Ross et al., 2015). Moreover, educational opportunities are often limited in peripheral areas, leading to lower levels of skills development and training (Deller et al., 2019). The migration of educated young people to more developed regions, particularly cities (Glaeser et al., 2012), in search of better job opportunities aggrevates this problem, creating a serious shortage of skilled labour for local entrepreneurial activity.

Institutional and cultural factors can either encourage or discourage entrepreneurial activity. From a local perspective, elements such as community support, social capital and the cultural environment play a crucial role in shaping entrepreneurial outcomes. This is particularly evident in non-urban regions, where, as Calispa-Aguilar (2024) points out, a supportive culture is of primary importance in promoting entrepreneurial activity. However, this environment is mostly not static (Malecki, 2018) and can evolve through the actions of entrepreneurs, business

environment institutions and other stakeholders. Ross et al. (2015) argue that the structure of the enterprise population matters, and that a positive entrepreneurial culture is created when a region has a significant number of small businesses, allowing a robust entrepreneurial support system to operate at the local level, providing access to resources and local knowledge.

While agglomeration typically promotes innovation and firm growth in urban areas (Sternberg, 2022), where proximity between firms, entrepreneurs and institutions facilitates knowledge spillovers, its absence in non-urban areas, particularly in peripheral regions, may limit access to resources, networks and market opportunities (Huggins et al., 2017). However, more isolated regions can overcome the lack of direct agglomeration effects by fostering informal knowledge sharing and creating collaborative networks (Audretsch et al., 2010).

Therefore, the regional spatial context can act as either a constraint or a facilitator of entrepreneurial activity. This underlines the important role of location in shaping entrepreneurship. Thus, the distribution of factors influencing entrepreneurial activity may differ at the micro spatial level within peripheral regions. We therefore propose the following hypothesis:

H1: The determinants of entrepreneurial activity exhibit variation at the micro spatial level within peripheral region.

3. Methods

In addressing the issue of spatial heterogeneity, we used a quantitative approach, as is widely used in previous research on the determinants of entrepreneurial activity (Acs et al., 2007; Sternberg, 2022; Miłek, 2023; Patel, Wolfe, 2023). As there may be a large number of such determinants, we used Hellwig's linear ordering method to identify the extent to which they differ at the micro spatial level in a peripheral region. Drawing on Jaśkiewicz (2020), we used this method to test our hypothesis and therefore to establish a single aggregate measure as a synthetic representation of the determinants of entrepreneurial activity, and consequently to order the micro spatial units accordingly. Therefore, we employed the following formula (Hellwig, 1968):

$$q_i = 1 - \frac{d_{i0}}{d_0} \tag{1}$$

where:

q_i – the aggregate measure,

d_{i0} – the distances of the objects from the reference object ($i = 1, \dots, n$),

$d_0 = \bar{d}_0 - 2s_d$, where: $\bar{d}_0$ – arithmetic mean of the distances of the objects from the reference object; s_d – standard deviation of the distance between the objects and the average distance from the reference object.

To calculate d_{i0} we used the following formula:

$$d_{i0} = \sqrt{\sum_{j}^{m} \left(z_{ij} - z_{0j}\right)^2} \tag{2}$$

where:
z_{ij} – the standardised value of the j-th variable for the i-th object ($i = 1, \dots, n;\ j = 1, \dots, m$),
z_{0j} – the coordinates of the reference object ($j = 1, \dots, m$).

To calculate z_{ij} we used the following formula:

$$z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j} \tag{3}$$

where:
x_{ij} – the value of the j-th variable for the i-th object,
$\bar{x}_j$ – arithmetic mean of the observations of the j-th variable,
s_j – standard deviation of observations of the j-th variable.

To calculate z_{0j} we used the following formula:

$$z_{0j} = \begin{cases} max_i\{z_{ij}\}\ for\ the\ stimulant\ variables \\ min_i\{z_{ij}\}\ for\ the\ destimulant\ variables \end{cases} \tag{4}$$

It is assumed that $q_i \in [0; 1]$, where $max\{q_i\}$ stands for the greatest similarity to the reference object and $min\{q_i\}$ for the least, which allows to rank the objects. It can also be used to group objects into classes of similar degree, where (Nowak, 1990):

the highest level: $q_i \geq \bar{q}_i + s_{q_i}$

high level: $\bar{q}_i \leq q_i < \bar{q}_i + s_{q_i}$

moderate level: $\bar{q}_i - s_{q_i} \leq q_i < \bar{q}_i$

low level: $\bar{q}_i < \bar{q}_i - s_{q_i}$

where:
$\bar{q}_i$ – arithmetic mean of q_i,
s_{q_i} – standard deviation of q_i,
other as described above.

In this study we used data from the micro level, NUTS-5. The data were locally disaggregated at the level of 71 basic spatial units (municipalities) covering the Opolskie Voivodeship, Poland, which represents a peripheral area (Zygmunt, J., 2024). Our data were derived from the Polish Central Statistical Office's Local Data Bank for the following years: 2015, 2020 and 2022, in order to examine the extent to which the determinants of entrepreneurial activity vary at different points in time: most recently, during the COVID-19 pandemic (Zygmunt, A., 2024), and a decade ago.

Our study addresses all the determinants of entrepreneurial activity that we were able to capture, given the availability of data at the micro spatial level. The description of the variables used in the study to construct the aggregate measure of the determinants of entrepreneurial activity at the micro spatial level in a peripheral region is presented in Table 1.

Table 1.
Description of variables

Variable	Description	Nature
X1 Supply side: Unemployment rate	Registered unemployed as a percentage of the working age population (%)	Stimulant
X2 Cultural environment: the structure of the enterprise population (1)	SME enterprises (0-249 employees) per 10,000 inhabitants	Stimulant
X3 Cultural environment: business environment institutions	Business environment institutions per 10,000 enterprises	Stimulant
X4 Cultural environment: the structure of the enterprise population (2)	Share of enterprises with up to 9 employees in the total number of enterprises registered in the National Official Business Register (REGON) (%)	Stimulant
X5 Demand side: Population density	Population per square kilometre	Stimulant

Source: Own elaboration based on the Polish Central Statistical Office's Local Data Bank.

4. Results and Discussion

Table 2 provides the descriptive statistics of the variables used in the study. On average, the micro spatial unit considered in the study has a registered unemployment rate of 4.46% of the working age population, contains 909 SME enterprises per 10,000 inhabitants and has a population density of 134 inhabitants per square kilometre. Enterprises with less than 10 employees dominate the landscape, accounting for 96% of the total number of enterprises registered in the National Official Business Register. A comparison of the minimum and maximum values of the variables shows a high degree of homogeneity between units in terms of enterprise size. However, there is evidence of heterogeneity when examining other variables within the analysis.

Table 2.
Descriptive statistics of variables

Variable	X1	X2	X3	X4	X5
Mean	4.46	909.03	784.67	96.09	134.70
St. dev.	1.53	226.33	479.39	1.03	298.45
Min	1.70	517.00	123.80	93.20	28.00
Max	9.30	1846.00	2026.30	98.30	2496.20

Source: Own calculation.

We tested our variables for collinearity and discriminability. We found no evidence of strong collinearity between the variables (Peason correlation coefficients were less than 0.7). However, we excluded variable X4 from further analysis due to its insufficient discriminatory power, evidenced by a coefficient of variation of less than 10%. Consequently, the final set of variables used to construct the aggregate measure of the determinants of entrepreneurial activity at the micro spatial level in a peripheral region consists of the following variables: X1, X2, X3, X5.

Table 3 provides the descriptive characteristics of the aggregate measure of the determinants of entrepreneurial activity in a peripheral region that we constructed for the micro spatial units using Hellwig's linear ordering method, whereas Table 4 shows the classification of these units according to the aggregate measure.

Table 3.
Descriptive characteristics of the aggregate measure of the determinants of entrepreneurial activity in a peripheral region

Year	2015	2020	2022
Mean	0.17	0.16	0.16
St. dev.	0.09	0.08	0.08
Min	0.03	0.04	0.03
Max	0.69	0.62	0.61

Source: Own calculation.

Table 4.
Ranking of micro spatial units by the aggregate measure of the determinants of entrepreneurial activity in a peripheral region

NUTS-5 code	Municipalities	2015		2020		2022	
		No.	q_i 2015	No.	q_i 2020	No.	q_i 2022
1661011	Opole	1	0.69	1	0.62	1	0.61
1601011	Brzeg	2	0.42	2	0.41	2	0.40
1611073	Zawadzkie	3	0.30	4	0.27	4	0.25
1602043	Kietrz	4	0.29	3	0.28	3	0.28
1607053	Nysa	5	0.24	6	0.23	11	0.21
1602033	Głubczyce	6	0.24	5	0.23	5	0.23
1607063	Otmuchów	7	0.23	7	0.23	10	0.22
1601033	Grodków	8	0.23	11	0.21	7	0.22
1607073	Paczków	9	0.23	8	0.22	6	0.22
1604013	Byczyna	10	0.22	9	0.22	8	0.22
1607042	Łambinowice	11	0.22	14	0.20	15	0.20
1603011	Kędzierzyn-Koźle	12	0.22	10	0.22	9	0.22
1601043	Lewin Brzeski	13	0.21	16	0.19	14	0.20
1601022	Skarbimierz	14	0.21	18	0.19	16	0.19

Cont. table 4.

1609073	Niemodlin	15	0.21	13	0.20	21	0.18
1606052	Wilków	16	0.20	17	0.19	13	0.20
1606012	Domaszowice	17	0.20	12	0.20	12	0.21
1605013	Gogolin	18	0.20	15	0.19	17	0.19
1606023	Namysłów	19	0.19	20	0.18	20	0.18
1609062	Murów	20	0.19	21	0.18	24	0.17
1610032	Lubrza	21	0.19	22	0.18	19	0.19
1607013	Głuchołazy	22	0.19	19	0.19	18	0.19
1602022	Branice	23	0.19	25	0.17	27	0.17
1609032	Dobrzeń Wielki	24	0.18	44	0.13	47	0.13
1609042	Komprachcice	25	0.18	39	0.15	37	0.14
1604043	Wołczyn	26	0.17	26	0.17	26	0.17
1610013	Biała	27	0.17	40	0.15	33	0.16
1608033	Olesno	28	0.17	33	0.15	36	0.15
1610043	Prudnik	29	0.17	24	0.17	29	0.16
1609022	Dąbrowa	30	0.17	43	0.14	45	0.13
1603062	Reńska Wieś	31	0.17	27	0.17	25	0.17
1605023	Krapkowice	32	0.17	30	0.16	30	0.16
1605053	Zdzieszowice	33	0.17	23	0.17	23	0.17
1609012	Chrząstowice	34	0.17	37	0.15	41	0.14
1601062	Olszanka	35	0.17	31	0.16	28	0.16
1606032	Pokój	36	0.16	32	0.16	32	0.16
1607082	Pakosławice	37	0.16	29	0.16	31	0.16
1601052	Lubsza	38	0.16	38	0.15	34	0.16
1606042	Świerczów	39	0.16	35	0.15	22	0.17
1609123	Tułowice	40	0.16	28	0.16	35	0.15
1610023	Głogówek	41	0.15	46	0.13	39	0.14
1609112	Tarnów Opolski	42	0.15	36	0.15	40	0.14
1609052	Łubniany	43	0.15	42	0.14	42	0.13
1602013	Baborów	44	0.15	45	0.13	44	0.13
1609132	Turawa	45	0.14	41	0.14	43	0.13
1604023	Kluczbork	46	0.14	34	0.15	38	0.14
1609083	Ozimek	47	0.14	47	0.13	46	0.13
1608023	Gorzów Śląski	48	0.14	53	0.12	52	0.12
1609103	Prószków	49	0.13	49	0.13	50	0.12
1611043	Leśnica	50	0.13	55	0.11	58	0.11
1607092	Skoroszyce	51	0.13	52	0.12	48	0.12
1607033	Korfantów	52	0.13	58	0.11	55	0.12
1611053	Strzelce Opolskie	53	0.13	56	0.11	59	0.11
1609092	Popielów	54	0.13	54	0.11	54	0.12
1603052	Polska Cerekiew	55	0.13	48	0.13	49	0.12
1608043	Praszka	56	0.12	60	0.10	60	0.10
1603042	Pawłowiczki	57	0.12	59	0.11	57	0.11
1605042	Walce	58	0.12	50	0.12	53	0.12
1604032	Lasowice Wielkie	59	0.12	51	0.12	51	0.12
1607022	Kamiennik	60	0.11	57	0.11	56	0.11
1603032	Cisek	61	0.10	62	0.09	61	0.09
1608052	Radłów	62	0.10	63	0.09	67	0.08
1608072	Zębowice	63	0.10	61	0.10	62	0.09
1608013	Dobrodzień	64	0.10	66	0.08	63	0.09
1611063	Ujazd	65	0.10	67	0.08	68	0.08
1603022	Bierawa	66	0.09	65	0.08	64	0.09
1605032	Strzeleczki	67	0.09	64	0.09	65	0.09
1608062	Rudniki	68	0.08	68	0.08	66	0.08
1611012	Izbicko	69	0.06	69	0.07	69	0.05
1611033	Kolonowskie	70	0.06	70	0.05	70	0.04
1611022	Jemielnica	71	0.03	71	0.04	71	0.03

Note: No. - number of micro spatial unit (municipality) in the ranking. The table shows the results to two decimal places.

Source: Own calculation.

The results indicate that while the determinants of entrepreneurial activity exhibit considerable variation at the micro level (NUTS-5), the spatial pattern of these determinants remains broadly consistent over the years analised. More specifically, the position of most micro spatial units in relation to other units with regard to the determinants of entrepreneurial activity, expressed by the aggregate measure, was largely stable over the years covered by the analysis. This finding is noteworthy, as it may indicate a relatively high degree of resilience to external shocks among most of the micro spatial units within a peripheral region. Alternatively, and more likely, it may indicate the presence of significant structural constraints that persist over time, thereby hampering entrepreneurial activity. For some micro spatial units, e.g. Świerczów, Olszanka, Kędzierzyn-Koźle, a positive change in the determinants of entrepreneurial activity was observed, reflected in a higher position in the ranking. Conversely, there was evidence of a significant worsening of the conditions for doing business in certain units, including Dobrzeń Wielki, Dąbrowa, Niemodlin, for which a significant drop in ranking was observed compared to previous years. However, due to the scope of the analysis, it was not possible to control for the factors (social, economic, political, environmental) that may have contributed to these changes.

Table 5 shows the classification of micro spatial units in a peripheral region into four groups with similar levels of determinants of entrepreneurial activity (low, moderate, high, the highest). As described above, the mean and standard deviation of the aggregate measure were used in order to establish these groups.

Table 5.
Classification by the level of determinants of entrepreneurial activity in micro spatial units in a peripheral region

Group	2015	2020	2022
low	Rudniki, Izbicko, Kolonowskie, Jemielnica	Izbicko, Kolonowskie, Jemielnica	Ujazd, Izbicko, Kolonowskie, Jemielnica
moderate	Olesno, Prudnik, Dąbrowa, Reńska Wieś, Krapkowice, Zdzieszowice, Chrząstowice, Olszanka, Pokój, Pakosławice, Lubsza, Świerczów, Tułowice, Głogówek, Tarnów Opolski, Łubniany, Baborów, Turawa, Kluczbork, Ozimek, Gorzów Śląski, Prószków, Leśnica, Skoroszyce, Korfantów, Strzelce Opolskie, Popielów, Polska Cerekiew, Praszka, Pawłowiczki, Walce, Lasowice Wielkie, Kamiennik, Cisek, Radłów, Zębowice, Dobrodzień, Ujazd, Bierawa, Strzeleczki	Tułowice, Pakosławice, Krapkowice, Olszanka, Pokój, Olesno, Kluczbork, Świerczów, Tarnów Opolski, Chrząstowice, Lubsza, Komprachcice, Biała, Turawa, Łubniany, Dąbrowa, Dobrzeń Wielki, Baborów, Głogówek, Ozimek, Polska Cerekiew, Prószków, Walce, Lasowice Wielkie, Skoroszyce, Gorzów Śląski, Popielów, Leśnica, Strzelce Opolskie, Kamiennik, Korfantów, Pawłowiczki, Praszka, Zębowice, Cisek, Radłów, Strzeleczki, Bierawa, Dobrodzień, Ujazd, Rudniki	Olszanka, Prudnik, Krapkowice, Pakosławice, Pokój, Biała, Lubsza, Tułowice, Olesno, Komprachcice, Kluczbork, Głogówek, Tarnów Opolski, Chrząstowice, Łubniany, Turawa, Baborów, Dąbrowa, Ozimek, Dobrzeń Wielki, Skoroszyce, Polska Cerekiew, Prószków, Lasowice Wielkie, Gorzów Śląski, Walce, Popielów, Korfantów, Kamiennik, Pawłowiczki, Leśnica, Strzelce Opolskie, Praszka, Cisek, Zębowice, Dobrodzień, Bierawa, Strzeleczki, Rudniki, Radłów

Cont. table 5.

high	Nysa, Głubczyce, Otmuchów, Grodków, Paczków, Byczyna, Łambinowice, Kędzierzyn-Koźle, Lewin Brzeski, Skarbimierz, Niemodlin, Wilków, Domaszowice, Gogolin, Namysłów, Murów, Lubrza, Głuchołazy, Branice, Dobrzeń Wielki, Komprachcice, Wołczyn, Biała	Głubczyce, Nysa, Otmuchów, Paczków, Byczyna, Kędzierzyn-Koźle, Grodków, Domaszowice, Niemodlin, Łambinowice, Gogolin, Lewin Brzeski, Wilków, Skarbimierz, Głuchołazy, Namysłów, Murów, Lubrza, Zdzieszowice, Prudnik, Branice, Wołczyn, Reńska Wieś	Głubczyce, Paczków, Grodków, Byczyna, Kędzierzyn-Koźle, Otmuchów, Nysa, Domaszowice, Wilków, Lewin Brzeski, Łambinowice, Skarbimierz, Gogolin, Głuchołazy, Lubrza, Namysłów, Niemodlin, Świerczów, Zdzieszowice, Murów, Reńska Wieś, Wołczyn, Branice
the highest	Opole, Brzeg, Kietrz, Zawadzkie	Opole, Brzeg, Kietrz, Zawadzkie	Opole, Brzeg, Kietrz, Zawadzkie

Source: Own elaboration.

The results indicate that there were no significant changes in the level of determinants of entrepreneurial activity within micro spatial units in the peripheral region over the years analysed, regardless of the group size. The determinants of entrepreneurial activity were mainly characterised by medium to high levels in most of the micro spatial units in the Opolskie Voivodeship. The groups with the highest and lowest levels of these determinants were limited to a few spatial units. In particular, the spatial units identified as having the most favourable conditions for entrepreneurial activity remained constant over the years studied, including the voivodship capital (Opole), another urban unit (Brzeg) and two urban-rural units (Kietrz, Zawadzkie). Similarly, the composition of the units with the lowest levels of favourable determinants for entrepreneurial activity (Izbicko, Kolonowskie, Jemielnica) showed minimal change over the years analysed. With regard to the type of micro spatial unit, our results showed that urban units had the most favourable conditions for entrepreneurial activity in all the years covered by the analysis. Over 67% of rural units had moderate conditions for entrepreneurship. In contrast, urban-rural units demonstrated a balanced distribution of conditions, with equal proportions classified as either moderate or high.

The determinants of entrepreneurial activity across micro spatial units in a peripheral region are illustrated in Figures 1-3, where the intensity of the grey scale represents the level of these determinants. Darker shades correspond to higher aggregate measures that reflect the determinants of entrepreneurial activity in the region.

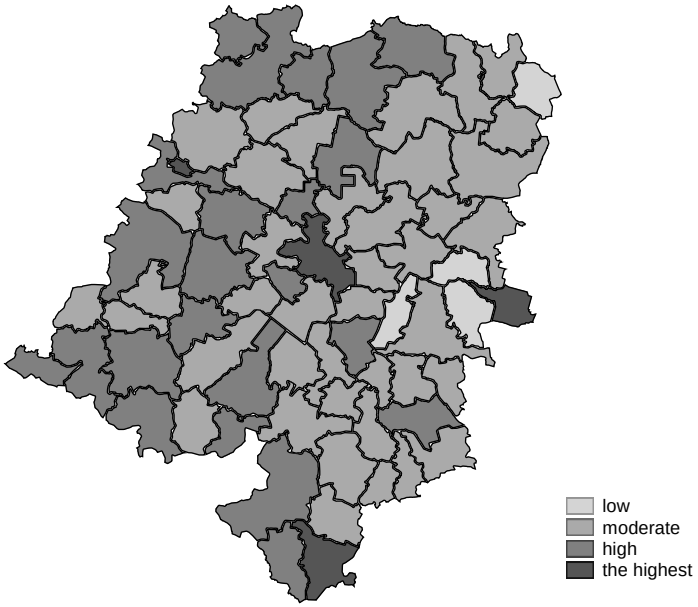

Figure 1. The spatial distribution of determinants of entrepreneurial activity across micro spatial units in the Opole Voivodeship in 2015.

Source: own elaboration.

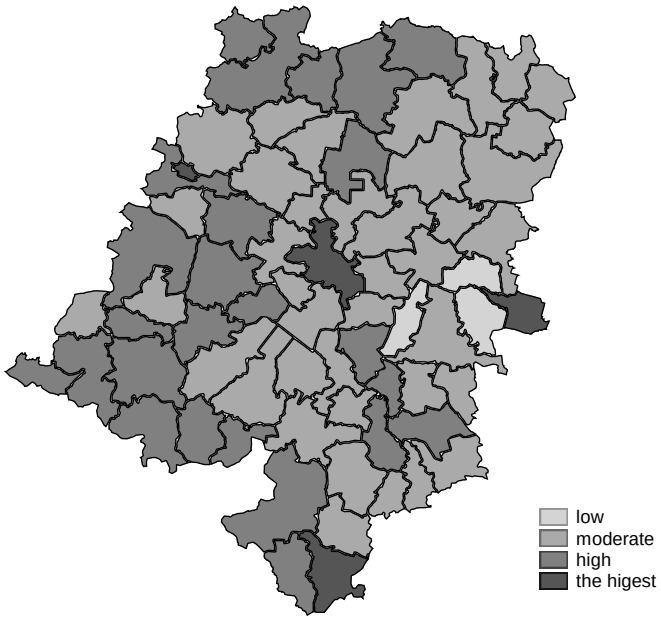

Figure 2. The spatial distribution of determinants of entrepreneurial activity across micro spatial units in the Opole Voivodeship in 2020.

Source: own elaboration.

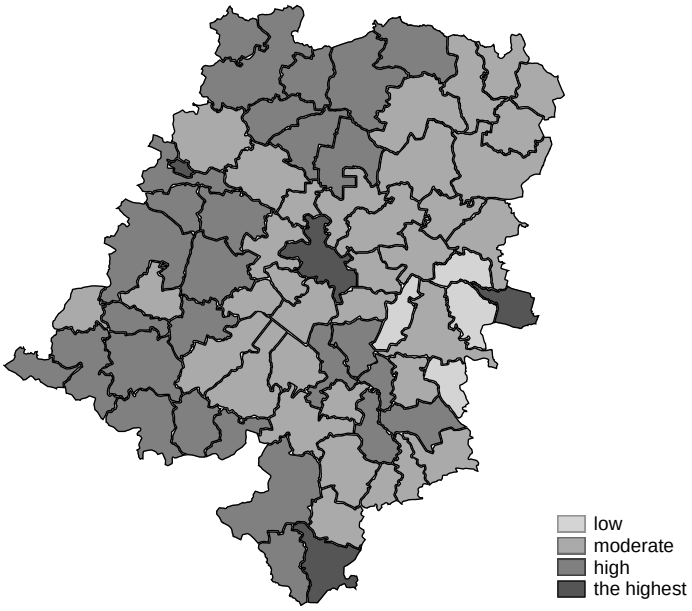

Figure 3. The spatial distribution of determinants of entrepreneurial activity across micro spatial units in the Opole Voivodeship in 2022.

Source: own elaboration.

The observed heterogeneity within the micro spatial units of the Opolskie Voivodeship provides evidence of distinct spatial patterns in the determinants of entrepreneurial activity within this peripheral region. Specifically, a clear division emerges across the years analysed: the western part of the Voivodeship shows a high level of determinants for entrepreneurship, with a trend of increasing development over time. In contrast, the eastern part exhibits moderate to low conditions for entrepreneurial activity, with micro spatial units characterised by the lowest conditions clustered in spatial proximity. It is striking that the areas with the most favourable conditions for entrepreneurship are generally not contiguous over the period analysed, suggesting a lack of spillover between neighbouring units. This may suggest the strong importance of local factors in entrepreneurship creation.

Our results show that the determinants of entrepreneurial activity vary at the micro level (NUTS-5) in a peripheral region and exhibit spatial heterogeneity, confirming Hypothesis 1. This is in line with previous studies on regional entrepreneurship, as local factors have been shown to play a crucial role in shaping entrepreneurial outcomes (Audretsch et al., 2010). While previous research has highlighted changes in regional entrepreneurial conditions due to external economic shocks, policy interventions or technological shifts (Malecki, 2018), we observe the persistence of spatial patterns in peripheral region over time. This is consistent with studies suggesting that entrepreneurial conditions in peripheral regions tend to be more resilient to external shocks (Fritsch, Wyrwich, 2013). This may be due to factors embedded in the local environment which tend to create ‘path dependency’ (Brekke, 2015) limiting significant changes in entrepreneurial outcomes over short periods of time. Our findings also confirm the observation of Glaeser et al. (2012), who found that urban areas tend to have more favourable conditions for entrepreneurship due to better infrastructure, access to markets and

higher levels of human capital. In addition, we find that rural areas tend to have more moderate conditions. This is consistent with research indicating that rural areas face greater challenges in fostering entrepreneurial activity, mainly due to lower access to resources and support systems (Calispa-Aguilar, 2024). Recent work by Duran (2023) has provided further evidence of how these disparities are widening, particularly in regions where technological advances or policies have not been equally distributed.

In contrast to previous studies, we found that the best conditions for entrepreneurship do not seem to spill over to neighbouring areas. This contrasts with the 'agglomeration effect' commonly reported in previous studies (Acs, Varga, 2005) which demonstrate that positive entrepreneurial conditions in one area can spill over to neighbouring regions through knowledge transfer and human capital mobility (Fotopoulos, 2023). The absence of such spillovers in the Opolskie Voivodeship is an interesting finding, suggesting a unique regional dynamic, possibly due to local factors such as limited connectivity or lack of cooperation between neighbouring units.

5. Summary

In this paper, we shed light on the extent to which the determinants of entrepreneurial activity differ at the micro spatial level in a peripheral region. Using the Opole Voivodeship in Poland as a case study, we present empirical evidence covering all 71 micro level NUTS-5 units that constitute the Voivodeship for the years 2015, 2020 and 2022. The results show that while, as hypothesised, the determinants of entrepreneurial activity vary at the micro level, the spatial distribution of these determinants remains relatively stable over time. This stability suggests two key interpretations: first, the resilience of many micro spatial units to external shocks, and second, the persistence of structural constraints that may limit entrepreneurial dynamism.

Our research contributes to the literature on entrepreneurship and regional development by demonstrating the spatially heterogeneous and persistent nature of determinants of entrepreneurial activity in peripheral regions at the micro spatial level. By identifying the lack of spillover effects between neighbouring units when one of them is considered to be the most conducive to entrepreneurship, we suggest that local policies, infrastructure and institutional frameworks play a dominant role in fostering or hindering entrepreneurship, even in close proximity. From a practical point of view, therefore, the results may have implications for regional development policies in terms of the prioritisation of local interventions for the promotion of entrepreneurship.

There are limitations to this study that suggest the need for further research. First, the study focuses on data for selected years, and while it demonstrates the heterogeneity of determinants influencing entrepreneurial activity in the periphery at the micro spatial level, it may be

anchored in broader environmental conditions, particularly at the national level, that we were not able to control for. Therefore, conducting comparisons over different time periods could provide an additional test of the robustness of the results. Second, due to constraints in the amount of data available at the micro spatial level, a limited number of determinants were used in our study. We recognise that other sets of determinants may lead to different conclusions at the spatial level, and therefore the inclusion of additional variables, as they become available, may extend the results obtained. Third, we suggest the use of alternative methods of data analysis at the micro spatial level in future studies. This could increase the robustness of our findings and contribute to a more comprehensive understanding of the determinants of entrepreneurial activity in this context.

References

1. Acs, Z.J., Armington, C., Zhang, T. (2007). The determinants of new-firm survival across regional economies: The role of human capital stock and knowledge spillover. *Papers in Regional Science, Vol. 86, No. 3,* pp. 367-392, doi: 10.1111/j.1435-5957.2007.00129.x
2. Acs, Z.J., Varga, A. (2005). Entrepreneurship, agglomeration and technological change. *Small Business Economics, Vol. 24*, pp. 323-334, doi: 10.1007/s11187-005-1998-4
3. Audretsch, D.B., Falck, O., Feldman, M.P., Heblich, S. (2010). Local entrepreneurship in context. *Regional Studies, Vol. 46, No. 3,* pp. 379-389, doi: 10.1080/00343404.2010.490209
4. Bosma, N., van Stel, A., Suddle, K. (2008). The geography of new firm formation: Evidence from independent start-ups and new subsidiaries in the Netherlands. *International Entrepreneurship and Management Journal, Vol. 4, No. 2*, pp. 129-146, doi: 10.1007/s11365-007-0058-8
5. Brekke, T. (2015). Entrepreneurship and path dependency in regional development. *Entrepreneurship & Regional Development, Vol. 27, No. 3-4*, pp. 202-218, doi: 10.1080/08985626.2015.1030457
6. Buratti, N., Sillig, C., Albanese, M. (2022). Community enterprise, community entrepreneurship and local development: a literature review on three decades of empirical studies and theorizations. *Entrepreneurship & Regional Development, Vol. 34, No. 5-6,* pp. 376-401, doi: 10.1080/08985626.2022.2047797
7. Calispa-Aguilar, E. (2024). The determinants of entrepreneurship in urban and non-urban regions: A fuzzy-set QCA approach. *Entrepreneurial Business and Economics Review, Vol. 12, No. 2,* pp. 143-156, doi: 10.15678/EBER.2024.120209
8. Deller, S., Kures, M., Conroy, T. (2019). Rural entrepreneurship and migration. *Journal of Rural Studies, Vol. 66,* pp. 30-42, doi: 10.1016/j.jrurstud.2019.01.026

9. Duran, H. (2023). The geography of entrepreneurship from a developing country perspective. The role of large spatial differences. *Entrepreneurship & Regional Development, Vol. 36, No. 7-8*, pp. 1016-1036, doi: 10.1080/08985626.2023.2253769
10. Fotopoulos, G. (2023). Knowledge spillovers, entrepreneurial ecosystems and the geography of high growth firms. *Entrepreneurship Theory and Practice, Vol. 47, No. 5*, pp. 1877-1914, doi: 10.1177/10422587221111732
11. Fritsch, M., Wyrwich, M. (2013). The long persistence of regional levels of entrepreneurship: Germany, 1925-2005. *Regional Studies, Vol. 48, No. 6*, pp. 955-973, doi: 10.1080/00343404.2013.816414
12. Glaeser, E.L., Ponzetto, G.A.M., Tobio, K. (2021). Cities, skills and regional change. *Regional Studies, Vol. 48, No. 1*, pp. 7-43, doi: 10.1080/00343404.2012.674637
13. Guerrero, M., Liñán, F., Cáceres-Carrasco, F.R. (2021). The influence of ecosystems on the entrepreneurship process: a comparison across developed and developing economies. *Small Business Economics, Vol. 57*, pp. 1733-1759, doi:10.1007/s11187-020-00392-2
14. Hellwig, Z. (1968). Zastosowanie metody taksonomicznej do typologicznego podziału krajów ze względu na poziom ich rozwoju oraz zasoby i strukturę wykwalifikowanych kadr. *Przegląd Statystyczny, Vol. 15, No. 4*, pp. 307-327.
15. Huggins, R., Prokop, D., Thompson, P. (2017). Entrepreneurship and the determinants of firm survival within regions: human capital, growth motivation and locational conditions. *Entrepreneurship & Regional Development, Vol. 29, No. 3-4*, pp. 357-389, doi: 10.1080/ 08985626.2016.1271830
16. Jaśkiewicz, N. (2020). Rozwój przedsiębiorczości polskich województw – podejście statyczne i dynamiczne w latach 2014-2018. *Studia Ekonomiczne. Gospodarka. Społeczeństwo. Środowisko, Vol. 2, No. 6*, pp. 54-71.
17. Malecki, E.J. (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography Compass, Vol. 12, No. 3*, e12359, doi: 10.1111/gec3.12359
18. Miłek, D. (2023). Spatial variations in the level of entrepreneurship in European Union countries. *Scientific Papers of Silesian University of Technology Organization and Management Series, Vol. 179*, pp. 329-353, doi: 10.29119/1641-3466.2023.179.17
19. Naudé, W., Gries, T., Wood, E., Meintjies, A. (2008). Regional determinants of entrepreneurial start-ups in a developing country. *Entrepreneurship & Regional Development, Vol. 20, No. 2*, pp. 111-124, doi: 10.1080/08985620701631498
20. Nowak, E. (1990). *Metody taksonomiczne w klasyfikacji obiektów społeczno-gospodarczych*. Warszawa: PWE, pp. 1-201.
21. Patel, P.C., Wolfe, M.T. (2023). Friends for richer or poorer: Economic connectedness, regional social capital, and county entrepreneurial activity. *Journal of Small Business Management, Vol. 62, No. 5*, pp. 2247-2286, doi: 10.1080/00472778.2023.2220013

22. Ross, A.G., Adams, J., Crossan, K. (2015). Entrepreneurship and the spatial context: A panel data study into regional determinants of small growing firms in Scotland. *Local Economy, Vol. 30, No. 6*, pp. 672-688, doi: 10.1177/0269094215600135
23. Stam E., Welter, F. (2020). Geographical Contexts of Entrepreneurship. In: M.M. Gielnik, M.S. Cardon, M. Frese (Eds.), *The Psychology of Entrepreneurship* (pp. 1-424). New York: Routledge.
24. Sternberg, R. (2022). Entrepreneurship and geography – some thoughts about a complex relationship. *The Annals of Regional Science, Vol. 69*, pp. 559-584, doi: 10.1007/s00168-021-01091-w
25. Zygmunt, A. (2024). Expenditures on innovation activities of firms in Poland at the NUTS-2 level (covid and post-covid perspectives). *Scientific Papers of Silesian University of Technology. Organization and Management, Vol. 195*, pp. 685-698, doi: 0.29119/1641-3466.2024.195.42
26. Zygmunt, J. (2024). The micro spatial diversity of the level of entrepreneurship in a peripheral region. *Scientific Papers of Silesian University of Technology Organization and Management Series, Vol. 200*, pp. 671-686, doi:10.29119/1641-3466.2024.200.50