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EXPORTING ACTIVITY IN RURAL REGIONS: DOES IT DIFFER FROM URBAN REGIONS? EVIDENCE FROM POLAND

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Abstract. Limited export potential can impede growth prospects. While core regions serve as hubs of globalization, the question remains as to how rural regions can increase their exports. By identifying the factors that enhance the export competitiveness of rural regions, particularly in comparison to urban regions, we can steer them towards sustainable development and overcome constraints related to remoteness. However, there is no simple or shortcut way of increasing exports in rural regions. It still requires long-term investments, improvements in human capital, inflows of foreign-owned entities, and advantageous operations of special economic zones. Social capital has a positive impact on exports at the regional level, but its effect could not be acknowledged in the subsets of regions. What should rural regions prioritise? Investing in human capital and promoting non-agricultural economic activities that have a greater impact on rural exports than urban ones.

Keywords: international trade, rural regions, FDI, human capital, social capital, special economic zones.

JEL Classification: O18, R11, R58, F14, F23.

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1. Introduction

Due to the growing globalisation, the economic situation of regions becomes more dependent and affected by external factors, such as trade and foreign direct investment (FDI) (Umiński & Nazarczuk, 2021). An inquiry into regions' socio-economic performance depicts serious differences in GDP per capita, unemployment, employment rate, entrepreneurship, etc. However, in particular, inequalities in regions' participation in foreign trade and export characteristics do not gain proper attention in the literature (Capello & Nijkamp, 2019). Moreover, while the literature on the region's exports is becoming more available, little is known about the nexus between FDI and exports, in particular in the specific context of rural regions, which do not receive proper attention in the public policy agenda (Tiwasing et al., 2023).

Rural regions typically export not as much as urban ones, due to less favourable environment for Small and Medium Enterprises' (SMEs) operation (Tiwasing et al., 2023). Therefore firms operating in rural areas are also less likely to export (Eff & Livingston, 2007). Such regions are economically disadvantaged in many areas in comparison to more developed urban areas. Rural regions usually lack infrastructure, including transport accessibility, communication infrastructure, affecting firms' operational and transactional costs. They have limited access to markets, due to mostly remote location and lower population than in urban areas. To make a matter worse, their economies are less diversified, usually more bound to rural activity with overall lower productivity across different sectors due to lower agglomeration economies and lower competition. Such regions lack highly qualified skilled labour, due to inferior education and lower population, what decreases the chances for finding workers with proper qualifications.

In this paper, we examine factors that have been proven to be crucial for exporting activity in urban regions and verify their actual impact in the case of rural regions. Based on the obtained results, we propose policy recommendations, fostering exports in rural areas. We acknowledge the importance of considering the particularities and challenges that regions confront, because assuming that the solutions and best practices that work for urban regions to improve their exporting activity will work for rural regions can be misleading to propose policy. Particularly, we explore differences among urban and rural regions in the determinants of the scale of exporting activity and aim to answer whether exporting activity in rural regions differs of that of urban regions. To the best of our knowledge, the determinants of exporting activity in rural regions have not been well explored yet. To cover this gap in the existing literature, in this paper, we focus our analysis on the case of Poland, a country that has received particular attention when analysing regional export activity (Brodzicki & Umiński, 2018; Ciżkowicz et al., 2013; Gajewski & Tchorek, 2017; Nazarczuk et al., 2020a, 2020b; Umiński & Nazarczuk, 2021).

To date, most of the available research focuses on finding the aftermaths of exports on income diversity. However, the research gap remains regarding particular role of foreign-owned entities (FOEs) in rural areas in particular. Also, little has been provided on differences between urban and rural exports, the role of social capital for increasing export capacity and human capital role in boosting rural regions' exports. The article identifies factors and pathways through which rural regions can boost their export competitiveness, focusing on various determinants, including FDI and other internal-related factors. So far, empirical evidence is scarce.

The paper uses a unique dataset for Polish counties (LAU 1, 380 territorial units) on the scale of exports, with a clear distinction for exports originating from domestic vs FOEs over the years 2004–2019. Furthermore, due to a relatively low level of geographical data aggregation, we can grasp county (LAU)-specific advantages of rural areas and juxtapose them with urban ones. We employ a series of system GMM estimations to grasp factors significantly affecting the scale of exports (log of exports) in urban and rural areas. For robustness checks, we reestimate models and verify if the results hold, when different variables are used.

The implications stemming from the research are essential for regional policy, especially in terms of increasing peripheral regions' chances to overcome a series of obstacles on their

growth path. Our results fit into the broad discussion on overcoming economic remoteness in rural regions, improving competitiveness, and increasing exports. The issue becomes particularly important nowadays, when regions are in even more severe competition due to increased openness and volatility on the markets (Umiński et al., 2023).

Hypotheses

Due to an inferior economic base of peripheral regions, we test if the marginal FDI-related economic benefits in exports are higher for rural regions than for urban regions. The paper tests the following hypotheses:

H1. *Investments in human capital increase exports in rural regions stronger than in urban ones.*

H2. *FDI-related effects in exports of rural regions are higher than in urban regions.*

H3. *SEZs reduce export inefficiency of rural areas stronger than urban ones.*

H4. *Social capital positively influences the export performance of regions.*

The following section provides the theoretical and empirical basis for the formulation of the hypotheses.

2. Literature review

The paper combines three theoretical perspectives: (a) core-periphery (C-P) framework, depicting the nature of rural regions' exports, vs the urban locations; (b) firms' heterogeneity, explaining the role of FOEs as drivers of region's exports, linking the regional economies with the international markets, and (c) sustainability transition perspective, understood as the ability of rural regions to effectively couple with the global markets through exports.

2.1. Core-periphery framework

Locations differ. In the C-P model of Wallerstein (1974), the world system is seen as a hierarchy of core and peripheral locations, performing different functions. According to Friedman (1966), the most competitive business activities are located in the most developed regions. The C-P differences are even more visible in export performance analysis (Brodzicki & Umiński, 2018; Nazarczuk et al., 2020a). C-P perspective is particularly interesting, as applied to the post-communist countries, new-EU member states, that witnessed dynamic economic growth, especially after the transition started and after entering the EU. As pointed out in the early literature on economic development (Hirschman, 1958), regional inequalities rise in the early development stages and stabilise or reduce in the mature growth phases. According to Hirschman (1958), the negative effects of competition for qualified labour force for the peripheral regions results in polarisation and further depress their export capacities. Investments in human and social capital increase the capacity to export, reducing the risk of entering and operating in foreign markets (**H1, H4**), as exports are for "a happy few" (Mayer & Ottaviano, 2008).

Baldwin and Okubo (2006) show selection and sorting effects in a Melitz-style model integrated into the New Economic Geography. The C-P context of regional resilience with exports as a key growth driver was proposed by Ženka et al. (2019). The extra-regional factors (including the activity of FOEs and their position in global value chains (GVCs) gain in importance, replacing the "traditional", regional context and locally available assets. The performance of regions strongly relates to the competitiveness of particular firms, especially FOEs, in exports (**H2**).

One of the common approaches to reducing C-P disparities (also in exports (Nazarczuk & Umiński, 2019) is the establishment of SEZs. However, the question arises whether the location of the SEZs reduces the existing inequalities (**H3**). Due to lobbying, in Poland and some other countries, SEZs and their subzones have been established in well-performing locations. Within a C-P model, Tetsu (2006) showed that establishing SEZs in urban areas is much more efficient than in rural ones. It is because the absorption effects in the former types of regions are higher.

2.2. Heterogeneity concept

The economic situation of regions becomes more dependent and affected by external, global factors: trade and FDI (Nazarczuk et al., 2020a; Umiński & Nazarczuk, 2021). Although the literature on the region's exports is becoming more available, little is still known about the nexus between FDI and exports, particularly in rural regions. Brodzicki and Umiński (2018) confirm path dependence and the role of historical factors and underline the role of metropolitan regions as the nodes of global trade flows. Ciżkowicz et al. (2013) show that exports of agricultural and food products from Poland's regions are positively affected by the share of agriculture in the economy, labour productivity and employees pool availability. However, the research gap remains regarding the role of FOEs.

The export capabilities of a region depend on the position of its firms in cooperative networks. Navaretti and Markovic (2021, p. 13) concluded that "top performers cluster in core regions". Their agglomeration is driven by self-selection (highly productive firms select most productive locations), selection (due to high competition in the core regions, the best firms survive only) and agglomeration (learning, sharing and matching). Due to self-reinforcing effects and increasing agglomeration dynamics, C-P differences grow.

Economic performance results from "strategic coupling" between regional assets, actors and the global economy. Localised capabilities are "created, reproduced, enhanced, or eroded through an interplay of" FOEs and domestic owned entities operations, local labour force as well as institutions (Micek et al., 2021).

Combining the heterogeneity concept (Melitz, 2003) with the theory of FDI allows expecting FOE's to be in a superior position vs domestic entities regarding the ability to export (**H2**). FOEs, using their ownership, localisation, and internalisation advantages (OLI paradigm) – reveal higher productivity (Antràs & Yeaple, 2014; Dunning & Lundan, 2008). FOEs' abilities to export, in particular, stem from better access to distribution networks, tacit knowledge, human capital, innovation capacity offered by other units within the multinational structures (Abreu et al., 2004), as well as fewer credit constraints (Manova et al., 2015). Mayer and Ot-

taviano (2008) show that internationalisation is "for the few"; FDI makers and exporters exhibit a superior position over non-exporters in terms of employment, value-added, wages, skills, human capital and capital intensity. The positive effects of FOEs on exports were provided by Cieślik et al. (2014), Sinani and Meyer (2004), Varblane and Ziacik (2000), Li et al. (2001), Rojec et al. (2004), Borin and Mancini (2016). However, formulating a simple rule related to the nexus between FDI and export performance cannot be done. MNEs are "multidimensional creatures" (Forsgren, 2008) and "beauty and a beast". Therefore, the nexus between FDI and trade needs verification (Blomström et al., 2002).

The structure of FOEs motives driving their operations matters (Behrman, 1972; Dunning & Lundan, 2008). Jensen (2002) points out that the positive effect that FDI exerts on exports can unambiguously be expected only in the case of resource-seeking, vertical FDI. Varblane and Ziacik (2000) expect export facilitation in the case of efficiency-seeking FDI. Estrin et al. (2008) suggest that the export "behaviour" of FOEs is even more complicated to be assessed, as the relative position of the subsidiaries within the MNE should be taken into account. We hypothesise that not only do FOEs positively contribute to peripheral and rural regions' exports but that FDI-related effects in rural regions are higher than in urban ones. In relatively low competitive rural regions, FOEs perform a catalytic function, boosting exports (**H2**). What matters, however, is the absorptive capacity of domestic firms to benefit from the spillover effects generated by FOEs sustainably.

Building sustainable foundations of economic growth are only possible if inequalities are effectively addressed (Schilling et al., 2018), which shall happen through productivity increases. At the regional level, productivity growth can be facilitated through the attraction of FOEs, acting as a catalyst of a transition, understood as a change involving fundamental technological and organisational upgrades (Loorbach & Rotmans, 2010). Thus we see the role of FOEs in facilitating the sustainable transition and "growing out" the regional economy beyond an existing development threshold and peripherality (Schilling et al., 2018).

One of the possibilities to attract FOEs is the establishment of SEZs (or similar types of privileged areas). SEZs stimulate FDI inflow (Nazarczuk & Krajewska, 2018; Wang, 2013), facilitate exports (Ge, 1999), generate employment and economic growth, mainly by increasing the pool of human and social capital but also by bringing the ownership advantages (**H4**). However, SEZ-induced effects, observed in rural vs urban regions, are not equal due to differences in the ability to attract FDI, absorption capabilities, FOE embeddedness in the local context, the intensity and the character of spillover effects. We envisage SEZs to reduce the export inefficiency of rural areas (**H3**) by channelling FDI and leveraging social and human capital. However, the nexus between FDI and social capital needs careful analysis. FOEs can positively or negatively affect social capital, similarly as they can exert a different influence on regional economies.

2.3. Sustainability transition perspective

Intensifying globalisation contributes to the increased regional polarisation. The question is on what kind of comparative advantages can peripheral regions rely, to participate in globalisation through engagement in GVC. The most probable is that they will rest on low labour

costs, which is not the "first-best" option from a sustainability perspective. It could lead to an immiserising type of growth, in the long term detrimental for a region's economy. Such a competitiveness base can be easily eroded by other locations, offering even lower costs. Nijkamp et al. (1990) noted that the sustainable development concept, perceived from the spatial perspective, reflects the resources and environmental constraints to facilitate regional development. A much more plausible alternative is the attraction of FDI, bringing ownership and internalisation advantages to the regional (localisation) context and creating chances for spillover effects to occur in the region, in the long-term leveraging its competitiveness base beyond low labour cost base. The nexus between openness (as represented by FDI) and sustainability is complex and can be neutral, positive, negative and non-linear (Shirazi et al., 2020). The challenge remains to attract the so-called optimum or "best" foreign investor, fulfilling ESG criteria and therefore contributing to regional sustainability, understood as "the continuous support of human quality of life within a region's ecological carrying capacity" building (Wackernagel & Yount, 1998, p. 513).

Besides human capital, also social capital is supposed to affect exporting potential of counties. According to Keeley (2007), social relationships influence human capital, which improves learning capabilities, important in exporting activity (Rodrigues & Child, 2012). The function of social capital can be described as a "glue" facilitating cooperation and innovations. However, the nexus between social and human capital is complex and subject to various interpretations (Muringani et al., 2021). Both of them are linked in a sort of virtuous circle (Keeley, 2007). Social capital is distributed across the regions in a heterogenous way (Arslan & Duran, 2021). Social capital brings positive effects to productivity and exports, inducing innovations, technological progress, entrepreneurship, reducing transactional costs, and asymmetries in information (**H4**) (Akçomak & ter Weel, 2009; Coleman, 1988; Putnam, 1993). On the other hand, the social capital deficit can hamper FDI inflow, if limitations in such immobile factors as schooling, agglomerations, and intermediate inputs exist (Clemens & Williamson, 2000; Putnam, 1995).

Finally, regional spillovers depend on absorptive capacity, which determines the possible gains in productivity. Navaretti and Markovic (2021) warn that the absorptive capacity of peripheral regions can be low, making the indigenous firms' interactions with highly productive FOEs difficult. Therefore, the cost of attracting FOEs can be extremely high. Peripheral regions lagging in terms of their export potential and the capacity to couple to globalisation that will not attract FOEs will require long-term investments from sources alternative to FDI. FDI attraction seems to be the optimum, first-best solution, boosting exports in a relatively short-term horizon (**H2**).

3. Materials and methods

The data used in the study, which depict Polish counties (*pl* powiat, LAU 1) over the years 2004–2019, come from several sources. Most of the data were obtained from Statistics Poland, depicting various socio-economic differences of Polish counties. Because information of the share of the population with higher education is obtained for particular years only (national censuses), the remaining data in-between were extrapolated for the years of the

study. Information on counties' exports come from Customs Chamber, whereas data on distances (between centroids of counties and points of interest/infrastructure endowments) were calculated in QGIS software. Finally, a proxy for social capital, a participation in every 4-year self-government elections (2006, 2010, 2014, 2018), was obtained from the National Electoral Commission. The missing observations for in-between years were extrapolated to sustain a fully balanced panel. Table 1 depicts particular variables used in the study.

Table 1. Descriptive statistics of the variables used in the study

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
lex	Ln of exports [EUR]	6080	18.4	1.55	10.9	23.4
lex_ pc	Ln of exports per capita	6071	7.11	1.26	0.516	10.5
lex_km2	Ln of exports per sq km	6080	13.5	2.05	5.69	19
foe	No. of FOEs (ln)	6460	3.89	1.32	–6.91	10.3
soc_cap	Social capital (proxy) – self-government turnout rate	6080	0.496	0.0581	0.266	0.713
road_dens	Roads per sq. km (ln)	6080	5.46	0.745	1.99	7.24
ldist_sez	Min. distance to nearest SEZ (ln) [km]	6460	2.34	0.968	–1.29	4.08
ldist_droad	Min. distance to domestic road (ln) [km]	6460	1.69	0.873	–1.86	3.12
sh_emp_i	Share of employed in industry	6080	.289	0.119	0	0.754
sh_h_edu	Share of population with higher education	6080	.326	0.113	0.103	0.834

The paper follows two successive steps to identify factors and pathways through which rural regions can enhance their export competitiveness. First, a general framework for estimating factors affecting exports at the regional level is established. Then, in a second step, a series of estimations are carried out for specific types of regions. Comparing the significance levels and magnitudes of the variables of interest leads to either confirming or rejecting the hypotheses formulated.

To avoid ambiguity in the choice of regions' taxonomy (which could be an issue when researchers follow their clustering scheme of LAUs), the paper follows regional typology by OECD. It divides Poland into three types of regions: urban, rural and intermediate (Figure 1).

To obtain robust findings, the paper utilises two-stage system GMM estimator, which is widely used in trade-related studies. The estimator can handle simultaneously time-variant and time-invariant variables, as well as endogenous variables. It is far more efficient than other panel estimators, like FE or RE, especially in the case when time dimension is shorter than the number of units (here regions). It can overcome the problem of different forms of endogeneity (Gnangnon, 2021), including the dynamic one (Li et al., 2021), by including the lagged dependent variable as a regressor, together with a series of internal and external instruments. Thus, it helps to identify the causal relationship between the variables of interest.

The use of the system GMM estimator is more efficient than the sole use of a difference or level GMM equation. Similarly, the two-step system GMM approach differs from the one-step approach in the way it deals with the endogeneity problem. The former estimates the

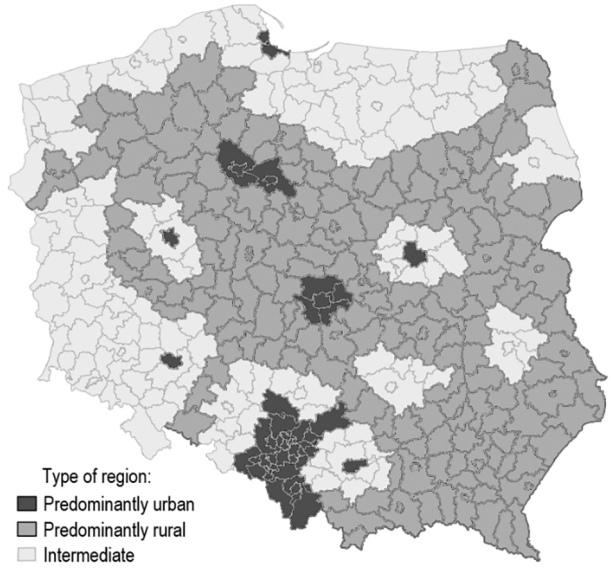

Figure 1. OECD regional typology for Poland

model parameters in two steps. In the first, lagged dependent variables are used as instruments for the endogenous variable. In the second step, the estimated residuals from the first step are used as instruments for the model parameters. On the contrary, in the one-stage approach, the model uses only the lagged dependent variable and other exogenous variables as instruments for the endogenous variable. The use of the two-stage system GMM over the one-stage system GMM results in reduced bias, improved efficiency and greater robustness to model misspecification (i.e. due to measurement error).

To assess the quality of the obtained results and models' assumptions, we run a series of tests following Li et al. (2021), which includes: AR(1) and AR(2) tests of the first and second-order serial correlation, further followed by two tests counterchecking the quality of instruments utilized. In this regard, we present the results of the Hansen J over-identification test, which validates if the used instruments are exogenous in the difference equation, together with the results of the difference-in-Hansen's J test of exogeneity counterchecking the exogeneity of instruments in the level equation. Insignificant values of Hansen J-tests add credibility to the obtained results with the system GMM approach, together with insignificant values of the AR(2) test. On the contrary, due to the inclusion of lagged dependent variable, it yields significant correlation in the AR(1) test. VIF yields values below 3, signalling no problems with multicollinearity in the equations.

The following equation was estimated:

$$y_{it} = \alpha_0 + \alpha_0 y_{it-1} + \alpha_k X_{1it} + \mu_i + \lambda_t + \varepsilon_{it}, \quad (1)$$

where y_{it} denotes one of three dependent variables (ln of exports, ln of exports per capita, ln of exports per sq km). X_{1it} stands for a vector of control variables. Independent variables are included into models as first lags to reduce the possibility of reverse causality between

independent and dependent variables. μ_i signals county fixed-effects, capturing unobservable time-invariant county characteristics. The inclusion of a series of year fixed-effects (λ_t) can control for global shocks affecting all of the regions. ε_{it} is an error term. Finally, robust standard errors are clustered by counties.

The usage of alternative dependent variables in estimations increases the robustness of the obtained results. Moreover, it presents factors affecting relative values of exports (exports per capita, exports per sq. km), indicating the agglomeration of exports at a local level.

4. Results

This section is divided into two parts. The first one depicts main stylised facts on exporting activity from a regional perspective to give a reader a more in-depth outlook for the inquired phenomenon and underline the significance of exports. The latter describes the estimation results and provides grounds for either rejection or acknowledgement of hypotheses.

4.1. Stylised facts on exports in Poland – a regional perspective

Poland has a relatively high level of exports to GDP ratio (55.6 percent in 2020), which has doubled since 1995 (22.9). Only from 2004 has it increased by approx. 21.4 pp. The expansion (from 2004) was among the few highest in the EU: including Ireland (47.1 pp.), Malta (37.5), Lithuania (25.3) and Slovenia (23.65).

Alongside the growing importance of exports in the national economy, we observe a significant pattern of regional inequalities. First, an explicit east-west divide in exports per capita is visible, with western regions having significantly higher levels of exports per capita (Figure 2). A second difference is identified around and in large cities and industrial agglomerations, mostly located in the west or south-west of the country. In contrast, the country's eastern side is depicted by lower export values per capita, even though these regions are less densely populated.

The differences are anchored in historical legacy, path dependence of these areas, differentiated quality of infrastructure endowments (i.e. road infrastructure), agglomeration economies, or closeness to large (mostly EU) destination markets. From a dynamic perspective, these inequalities grew from 2004 to 2009 but tended to narrow until 2019[1]. Different types of regions followed various growth paths (Table 2), with rural regions having the highest export growth between 2004 and 2019.

The spatial inequalities also translate into differences observed among particular types of areas. Thus, for example, the division of Poland into three types of areas, using the OECD regional typology, yields significant differences in exporting activity between rural and urban areas (Table 3), indicating higher exports, exports per capita and higher share of FOEs in exports in urban regions.

Rural regions are the least internationalised compared to other regions' types, with numerous structural issues, hampering their growth abilities, like very low no. of tertiary graduates, very low number of economic entities, including foreign-owned ones, low value of foreign capital, non-rural contribution to employment or general output.

[1] When we take into consideration coefficient of variation, calculated at a county level for exports per capita.

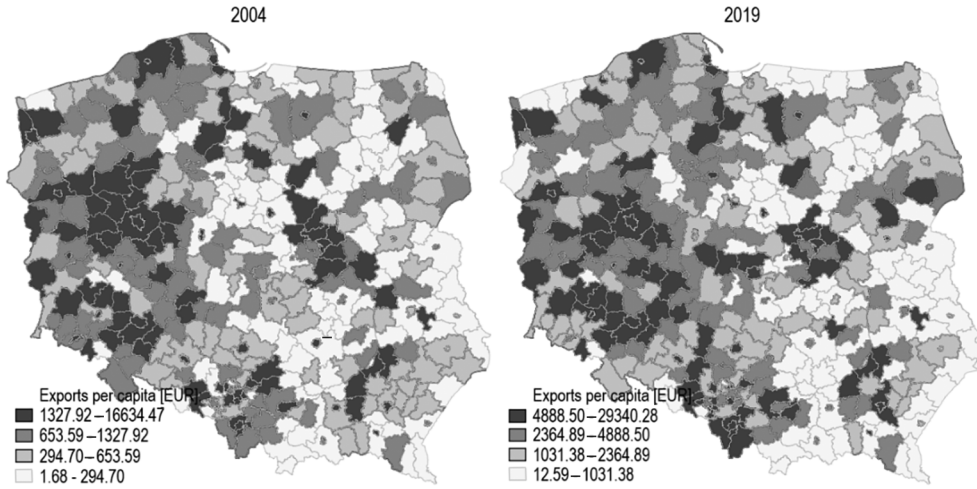

Figure 2. Exports per capita in Polish counties in 2004 and 2019 (source: authors' own elaboration)

Table 2. Exports in Polish regions (bn EUR)

Region	2004	%	2008	%	2010	%	2019	%	Δ 2004–2019 (%)
Urban	25.27	44.75	45.91	44.58	43.26	42.79	67.86	38.89	168.51
Rural	11.90	21.08	21.99	21.36	21.81	21.57	41.55	23.81	249.03
Intermediate	19.30	34.17	35.08	34.06	36.03	35.64	65.08	37.30	237.17
Total	56.48	100.00	102.98	100.00	101.10	100.00	174.49	100.00	208.95

Table 3. Differences among rural and urban areas

	Rural (means)	N1	Urban (means)	N2	Difference (means)
Exports [M EUR]	138.30	3088	1015	768	–877***
Exports per capita [EUR]	1683.36	3088	3848.26	768	–2164.9***
Share of FOEs in exports [%]	36.25	3088	48.87	768	–12.62***

Note: *** indicates significance at 1% level. The table presents T-tests between rural and urban regions over the period of 2004–2019. Non-parametric versions of the test also indicate significant differences among these types of regions.

4.2. Estimation results

The following columns of Table 4 present estimates for the full sample of regions, rural and urban respectively. The results show a positive role for the previous level of exports and for a number of control variables such as sectoral structure, quality of education, social capital, operation of FOEs, density of road network together with proximity to special economic zones (SEZs). A higher share of industrial employment correlates well with the value of exports, as the former only includes manufacturing exports due to data availability. Nevertheless, the vast majority of Poland's exports come from manufacturing (over 80%).

A higher share of well-educated population, which increases the pool of well-qualified workers, has a positive effect on the level of exports. The effect is even stronger in rural regions than in urban ones (Table 4, estimates 2 and 3), with its magnitude and significance being significantly higher in the former. This observation may be the result of higher marginal returns to higher quality human capital in regions with lower levels of education, which so far have been rural.

Another factor influencing the size of exports is the activity of FOEs, which on average account for about 42 per cent of total exports in the regions. Their operations tend to be much more internationalised than those of domestic enterprises, i.e. due to adopted strategy, past experience, OLI advantages.

A good transport infrastructure also appears to be crucial for exports, together with the close proximity of SEZs, where firms can obtain profit tax exemptions for their operation. Both can reduce some of the operating costs of firms, provide additional benefits (e.g. agglomeration economies), and reduce the time needed to reach distant markets.

The role of social capital also appears to be crucial, as it represents the willingness of the population to take action, self-govern, participate in various social networks, share knowledge, etc. This can enhance the possibility of starting exports (by reducing, i.e. uncertainty) and increasing exports volume, especially in the first years of operation (Evald et al., 2011).

In the rural-urban context, the quality of human capital in rural regions is of greater importance and magnitude for exports than in urban regions. Similarly, rural regions with developed industrial production are more responsive to increased export levels than urban regions. For other control variables, however, the observed differences are smaller and favour urban regions over rural ones in terms of magnitude (the number of FOEs, road density and proximity to SEZs). In these cases, urban regions respond more strongly to additional increases in the number of FOEs and road density, and to decreases in the distance to SEZs. On the other hand, social capital had an insignificant effect on the export value of rural and urban regions separately, whereas is effect was strongly positive on the whole sample of regions.

For robustness tests, we rerun estimations on different dependent variables with a slightly changed set of control variables. Now, exports per capita (ln) and exports per sq. km (ln) act as dependent variables, signaling the relative abundance of exports. In the current setting, a variable representing general road density was replaced with min. distance to a domestic road (ln), which may in a different way represent actual differences in the national road network.

Table 5 shows the estimation results for alternative dependent variables. Most of the control variables are still significant, with some minor differences that do not change the previous picture of regional export determinants, especially at the full sample of regions. At this level, all previous variables have a significant impact on the relative abundance of exports and maintain their direction, including social capital. Whereas, in the case of the distance to domestic road network, it significantly affected exports per sq km, but was insignificant in the case of exports per capita.

There are some differences between rural and urban areas, where not all variables are significant or maintain their magnitude. For example, similar to previous estimates, the role of social capital is insignificant only for urban and rural regions. Similarly, distance to the domestic road network is insignificant for exports per capita.

Proximity to SEZs significantly facilitates the level of relative exports, but the magnitude is higher in urban regions. A higher share of employment in the second sector significantly affects the relative value of exports, but the magnitude of the effect is stronger in urban regions. The quality of human capital also significantly affects the relative level of exports, but the effect is smaller in rural regions.

Analysis of key variables of interest enables a clear distinction, which allows for either acknowledgement or rejection of the formulated hypotheses. The role of human capital in creating exports is significant and positive in all the estimations in Table 4. Its effect is higher in the case of rural regions when the level of exports was considered, which leads to the recognition of hypothesis **H1**. A higher share of the population with higher education, on average, increases counties' volume of exports in all of types of counties.

Table 4. Factors affecting the scale of exports at a regional level

Variables	(1)	(2)	(3)
	all regions	rural regions	urban regions
L.lex	0.930*** (0.143)	0.824*** (0.155)	1.002*** (0.106)
L.foe	0.093*** (0.026)	0.079*** (0.028)	0.115** (0.058)
L.soc_cap	0.298** (0.146)	0.331 (0.259)	–0.558 (0.548)
L.road_dens	0.063*** (0.020)	0.068* (0.036)	0.097* (0.053)
L.ldist_sez	–0.062*** (0.019)	–0.050* (0.027)	–0.058* (0.035)
L.sh_emp_i	0.675*** (0.192)	0.936** (0.383)	0.591** (0.281)
L.sh_h_edu	0.395*** (0.150)	0.470** (0.218)	0.397* (0.264)
Constant	2.292*** (0.601)	2.181*** (0.830)	2.460*** (0.854)
Observations	5,700	2,895	720
County FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Wald chi2	9.345e+06	4.410e+06	1.407e+06
AR(1) (p-value)	0.001	0.008	0.010
AR(2) (p-value)	0.650	0.324	0.536
No. of instruments	58	58	36
Hansen test (p-value)	0.239	0.427	0.627
Difference-in-Hansen test of exogeneity (p-value)	0.538	0.596	0.505

Note: Clustered-robust standard errors in parentheses. ***p < 0.01, ** p< 0.05, *p < 0.1. L. stands for the first lag.

Table 5. Alternative scenarios for determinants of exports at a regional level

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	lex_pc all regions	lex_pc rural regions	lex_pc urban regions	lex_km2 all regions	lex_km2 rural regions	lex_km2 urban regions
L.lex_eur_pc	0.881*** (0.139)	0.853*** (0.134)	0.599*** (0.105)			
L.lex_per_km2				0.914*** (0.155)	0.835*** (0.163)	0.608*** (0.110)
L.foe	0.046*** (0.013)	0.037** (0.015)	0.136*** (0.042)	0.076*** (0.022)	0.080*** (0.031)	0.182*** (0.063)
L.soc_cap	0.325** (0.151)	0.272 (0.212)	0.211 (0.544)	0.809** (0.326)	1.141 (0.751)	–0.393 (0.575)
L.ldist_droad	0.002 (0.009)	0.008 (0.011)	0.073 (0.052)	–0.121*** (0.033)	–0.092** (0.045)	–0.109 (0.067)
L.ldist_sez	–0.019* (0.010)	–0.010* (0.012)	–0.142** (0.062)	–0.124*** (0.037)	–0.101* (0.052)	–0.266*** (0.100)
L.sh_emp_i	0.751*** (0.188)	0.921*** (0.299)	1.170*** (0.364)	0.922*** (0.248)	0.918** (0.442)	1.549*** (0.600)
L.sh_h_edu	0.214* (0.117)	0.204* (0.162)	1.211*** (0.428)	0.378** (0.160)	0.319* (0.226)	0.850* (0.564)
Constant	0.697*** (0.178)	0.712** (0.282)	1.691*** (0.620)	2.001*** (0.623)	1.307* (0.956)	4.960*** (1.177)
Observations	5,700	2,895	720	5,700	2,895	720
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Wald chi2	1.814e+06	1.058e+06	109457	3.388e+06	1.894e+06	276044
AR(1) (p-value)	0.00157	0.00221	0.0230	0.00177	0.00888	0.0184
AR(2) (p-value)	0.383	0.324	0.460	0.600	0.291	0.590
No. of instruments	58	58	24	57	57	35
Hansen test (p-value)	0.336	0.551	0.322	0.311	0.306	0.117
Diff-in-Hansen test (p-value)	0.240	0.140	0.645	0.104	0.194	0.840

Note: Clustered-robust standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. L. stands for the first lag.

However, the values for relative value of exports (exports per capita, exports per sq. km) don't acknowledge the previous finding. In this scenario, increments to human capital in rural regions are of lesser magnitude, if compared to urban counties.

FOEs have a positive effect on the export performance of both types of counties. However, the magnitude of the effect differs between the two and is higher in the case of urban regions, leading to the rejection of **H2**, according to which FDI-related effects on exports are higher in rural regions than in urban ones. The effect is similar in the case of relative export

performance (exports per capita, exports per square kilometre). Therefore, the results do not show a direct shortcut for rural regions in terms of increasing their export capacity, i.e. by increasing the attractiveness of FDI, which may ultimately benefit other types of counties.

The establishment of SEZs increases the export performance of regions. The closer the distance to the SEZ, the higher the absolute and relative value of exports. But again, the magnitude of the effect is stronger in smaller urban regions than in generally larger rural ones. This brings us to the rejection of **H3**. In the absence of better data, we cannot augment this variable with others to show the effect of SEZs. Similarly, as in the case above, there may be a selection of regions where firms invest in SEZs.

Social capital has a positive effect on exports, regardless of the dependent variable used, leading to the confirmation of **H4**. In most of the estimations, the magnitude of the impact is quite high, but the significant effect is only present for the whole sample of regions. When the regions are divided into subsets, the significance disappears. This observation requires further investigation, when other variables representing social capital are available.

The analysis of obtained findings leads to the acknowledgment of **H1**, **H4** and the rejection of **H2** and **H3**. The results on H2 and H3 might be different if local suppliers for exporting firms (indirect exporters) (Szejgiec & Komornicki, 2015) were also incorporated into the analysis. Since the data on indirect exports (when local firms are suppliers for ultimate exporters) are not available for counties, the analysis utilises data on ultimate exporters only. It is likely that in rural areas, locally owned firms might be more often indirect exporters, supplying ultimate exporters, which in turn tend to localize more often in urban areas or are more frequently foreign-owned.

International trade is dominated by global value chains (GVCs), which are mostly determined by large foreign-owned enterprises and their affiliates (United Nations Conference on Trade and Development [UNCTAD], 2013). Therefore, areas of export concentration mostly follow urban-rural disparities and are concentrated in and around highly urbanised areas, also in Poland (Szejgiec & Komornicki, 2015). Similarly, firms in SEZs tend to choose more urbanised areas over rural ones, which gives them a number of advantages.

5. Discussion

Stylised facts and the results of the estimations with various dependent variables used for different types of counties show significant regional inequalities of export capabilities. It provides a supplementary perspective for the analysis of regional inequalities as such. These differences are persistent, reflect the path-dependent, historical factors, the logic of the agglomeration processes and the gravity phenomenon (proximity to the large EU countries' markets). Our results are in line with the research of Brodzicki and Umiński (2018), Nazarczuk et al. (2020a, 2018), Brodzicki et al. (2018), confirming the general pattern of inequalities as regards exports and their roots. The question arises, formulated from the perspective of economic development policy, what sort of economic policy instruments can be implemented to reduce these differences, once we agree that inequalities are detrimental.

Our results are in line with Simmie (2003) conclusions, depicting the links between knowledge and exports. Human capital is a part of the knowledge pool used to improve the export

performance of regions. Knowledge and human capital create innovations that determine competitiveness and build the export base of regions (Contractor & Mudambi, 2008). In the case of absolute exports, the effect of human capital was stronger in rural regions, suggesting that the marginal effects of human capital investment may be higher there, due to the lower education of the workforce. In the case of relative export performance, on the other hand, we found that the impact of human capital was stronger in urban regions, demonstrating the importance of agglomeration effects through which tacit knowledge is shared. Our results show the advantages possessed by the core regions over the peripheral ones, consistent with general observations related to the concentration of the knowledge and innovation pool (Feldman, 1994; Feldman, 1999; Pred, 2017).

We broaden the research perspective proposed by Ciżkowicz et al. (2013), Gajewski and Tchorek (2017) and focus on the core-periphery framework, incl. the role of exogenous factors (FDI, SEZ). One of the premises that we rely on is that our inquiry into stylised facts and previous research has shown that there can be "hot spots" of exports even in the less competitive regions. The "usual suspect" was the activity of FOEs, representing the input of ownership advantages, exogenously brought, combined with localisation advantages of particular regions. We decided to carefully inspect it, using the data disaggregated to LAU-1 units. While the positive FOEs' influence on exports has been confirmed for the whole sample of counties, our expectations formulated in **H2** (that FDI-induced effects in exports of rural regions are higher than in urban ones) have not. As stated by Navaretti and Markovic (2021), probably the absorptive capacity matters, which is proved by the results obtained for urban regions, for which the coefficients for FOEs role are higher than for rural counties. The results are contrary to what we expected. We envisaged rural regions exports to benefit more, vs other, more developed ones. It turns out that probably what matters more is the absorptive capacity and the "power of agglomeration" effects, stronger in urban counties.

Rural areas, need something "more" than simply establishing SEZs on their territories to boost exports. Despite the generally positive effect of SEZs on export activity, also at a local level, the findings lead to the rejection of the **H3** hypothesis. In most of the scenarios, the SEZ effect in rural areas was smaller than in urban ones, albeit significant. It could result from a selection of regions by investors (who can prefer similar plots with SEZs in more developed, highly attractive areas), lower productivity of firms in lagging areas, and lower absorption capabilities. In this sense, the results extend the general findings of the positive role of SEZs in increasing exports (Nazarczuk & Umiński, 2018) at the local level, by showing the inter-regional heterogeneity of their influence. Similar, heterogeneous effects in other aspects of SEZs operations were seen by Ambroziak and Hartwell (2018), Cicha-Nazarczuk (2021), Wang (2013), probably due to significant disproportions in the development of particular zones, their number and different locations, which affect zonal performance and the quality of their governance (Dorożyński et al., 2021).

Our results also shed new light on the role of social capital in exports, which effects till now was examined on productivity and economic growth. The direct influence on exports was not thoroughly looked into. As social capital is supposed to affect productivity and innovativeness positively, it, therefore, shall indirectly influence exporting capacity (this stems from firms' heterogeneity theory). We have shown indirect influence. Our results are in line

with Evald et al. (2011) and confirm **H4**. Similar results were obtained for the role of social capital by Michael et al. (2016), for firm-level research on factors affecting non-exporting small and medium firms. Our results, to some extent, confirm the research of Rodrigues and Child (2012), depicting the role of social capital as an instrument providing informational and interpretation capacities for particular firms' exports. Our research is done on more aggregated data. However, the approach of Rodrigues and Child (2012) is a possible direction for further research.

6. Conclusions

The research shows another example of regional inequalities, which is exports, analyzed at a local level. By identifying the factors and paths through which rural regions can boost their export competitiveness, we direct them into the sustainable development track to overcome their remoteness-related constraints. Unfortunately, there is no simple, shortcut mean of increasing exports. Rural areas require long-term investment activities, including upgrading human capital. Therefore, such regions should not rely solely on the activity of FOEs, which resulted in a less profound effect on exports than in urban areas. Similarly, the effects of SEZs are positive both in urban and rural regions, but the effect is stronger in urban ones.

Further research should be directed toward overcoming the main limitations of our study. The data covers only direct exporting (ultimate exporters) and does not account for indirect exporters (when local firms are suppliers for ultimate exporters). Services exports also ought to be taken into account (neither of them are available for counties). With such data, the results could be different. Alternative measures of the social capital can be employed, together with its interactions with other determinants. Another econometric strategy may be employed to receive even more robust findings.

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Author contributions

Conceptualization: J.N., S.U., L.M-R.; data curation: J.N.; calculations & estimations: J.N.; funding acquisition: S.U, J.N.; investigation: J.N., S.U.; methodology: J.N., L.M-R.; validation: S.U.; visualization: J.N., writing – original draft: J.N., S.U., L.M-R.; writing – review & editing: J.N, S.U.

Disclosure statement

Authors declare no conflict of interest.

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