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Unemployment and new firm formation: evidence from Polish industries at the regional level

JEL Classification: R12; R30

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Abstract

Research background: The present study takes the regional economics perspective to explaining new firm registrations. It focuses on the driving role of unemployment rate in the process of new business formation.

Purpose of the article: The main goal of the study is to investigate the effect of regional unemployment (next to other regional characteristics) on subsequent new business formation in Polish regions for the period 2003–2018. The research hypothesis assumes that a rise in unemployment rate has a positive effect on subsequent new business formation. The positive unemployment push effect is expected to be stronger in operational services.

Methods: In order to verify the links between unemployment rates and entrepreneurship, panel data methods (fixed effect Driscoll-Kraay and p-VAR estimators) were applied. The analyses were performed at the industry level (manufacturing, construction, wholesale and retail, hotels and restaurants, and financial services) using regional annual data for the period 2003–2018.

Findings & value added: This study provides further insight into the unemployment push hypothesis by distinguishing between industry sectors and by considering regional specificities in post-communist economies (e.g. Poland). The findings provide value for policy-makers regarding the selection of policy instruments intended to stimulate regional development through entrepreneurship in lagged areas.

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Introduction

Entrepreneurial activity typically refers to the leveraging of resources and capabilities through innovation, the identification of opportunities, and the creation of economic and non-economic value (Ahmad & Seymour, 2008). This point of view emphasises a business opportunity and the risk-taking nature of individuals as the main drivers of entrepreneurship. Next to opportunity entrepreneurship, however, the literature identifies a different motivation for starting a business, referred to as necessity entrepreneurship. Necessity entrepreneurs are not motivated by market opportunities but are forced into starting a business by the lack of better or even any other prospects of employment (Block & Wagner, 2010). Thus, against the backdrop of various factors which may influence new firm formation, labour market conditions (unemployment) also seem to play an important “driving” role. In addition, the proportion between the two types of entrepreneurship are crucial to socio-economic development, as necessity entrepreneurs are found to have smaller growth, innovation and employment potential (Fairle & Fossen, 2018).

Unemployment may affect the process of new business formation in contradictory ways. It is captured by the unemployment push (positive correlation) or prosperity pull (reverse, negative correlation) effects. Moreover, these effects are conditioned by sector- and region-specific determinants. In particular, industries with low entry barriers are assumed to be more sensitive to unemployment rate increases (Román *et al.*, 2013). As regards territorial aspects, unemployment seems to affect more new business dynamics, where there are fewer incentives for entrepreneurial activities (Huggins *et al.*, 2017). Structural problems of less developed economies may mitigate, however, the effect of unemployment rate (Calá, 2018). Moreover, this relationship may differ among countries, depending on their institutional framework and can develop differently in Central and Eastern European (CEE) countries, where the culture of entrepreneurial activities has a shorter history.

Those issues have attracted the interest of researchers relatively recently, with their analyses usually being focused on developed countries (Naudé *et al.*, 2008; Calá, 2018). Furthermore, empirical findings still have not provided conclusive results regarding the presence of the unemployment push effect. Hence, the main goal of the study is to investigate the effect of regional unemployment (next to other regional characteristics) on subsequent new business formation in Poland. In order to provide further insights into the research area, in particular with respect to CEE countries, the study distinguishes among industry sectors (manufacturing, construction, whole-

sale and retail, hotels and restaurants, and financial services) and simultaneously considers regional specificities in post-communist economies.

The analyses cover the period 2003–2018¹ (the longest possible period of analysis) and use annual data retrieved from the Polish Central Statistical Office (Local Data Bank), the Ministry of Family and Social Policy and the Global Data Lab. Panel data methods (fixed effect Driscoll-Kraay and p-VAR estimators) were applied to investigate the links between unemployment rates and new firm registration.

The study consists of several sections. The first section provides a critical review of previous research on the relationship between unemployment and new firm formation. The second section describes the research methods. The following sections present and discuss the research results. The paper concludes with a summary of the most important research findings.

Literature review

The entrepreneurship literature evidences that unemployment may motivate one to become an entrepreneur. At the micro level, Evans and Leighton (1990) show that in the US, unemployed individuals are about twice as likely to start a new firm as employed workers. At the macro level, Thurik *et al.* (2008) confirmed that in 1974–2002 unemployment caused self-employment to increase in 23 OECD countries. This has been referred to as unemployment push or the refugee effect.

At the micro level, starting a new firm is perceived either as a way of avoiding unemployment or as a response to deteriorating wage prospects. In the light of occupational choice theory, these decisions are explained by the diminishing opportunity cost of starting a business (Fairlie & Fossen, 2018). This reasoning is also valid at the macro level when involving the business cycle. During a recession, the operating costs of businesses tend to decrease due to greater supply of labour and lower interest rates, which might be conducive to establishing enterprises, in particular large-size ones (Konon *et al.*, 2018). These explanations give theoretical support for a positive association between unemployment and start-up activity.

Conversely, there are regions or countries where a high rate of unemployment is accompanied by a low level of entrepreneurship. At the regional level, higher unemployment might be a manifestation of structural problems of the regional labour market and relatively slow economic growth in the region, thereby hampering entrepreneurial activity (Santarelli & Tran,

¹ Due to data availability of covariates.

2012). At the macro level, this point of view is also related to the prosperity pull effect, according to which during a market downturn higher unemployment rates decrease aggregate demand, which discourages entrepreneurs to start new businesses (Parker, 2009). The reverse relationship between unemployment and entrepreneurial activity can also be explained at the micro level. Due to a lower level of entrepreneurial skills, little human capital and limited access to financial resources, unemployed individuals are perceived as less prone to set up new businesses (van Stel & Storey, 2004). These theories underpin a negative association between unemployment rate and new firm entry.

As becomes clear from the literature review, the effect of unemployment on new firm formation can be investigated at the micro or aggregate levels. The present study takes the latter approach and focuses on regional variation in new business formation caused by unemployment rates (next to other regional entrepreneurship drivers).

Theoretical, but also empirical studies lead to ambiguous conclusions on the relationship between unemployment and the number of new firms established. For developed countries, a more frequent finding is that business creation increases during recessions (Baptista & Preto, 2007; Thurik *et al.*, 2008; Fritsch *et al.*, 2015). Remarkably, in developing countries (e.g. Vietnam, South Africa, Argentina), the impact of unemployment rate on business entry has been found to be mostly insignificant (Santarelli & Tran, 2012; Naudé *et al.*, 2008; Calá, 2018). For CEE countries, there is evidence both supporting the unemployment push hypothesis (Dvoulteý, 2017; Tyrowicz & Nestorowicz, 2010), as well as indicating the lack of any statistically significant relationship between start-up dynamics and unemployment (Hájek *et al.*, 2015; Cichocki, 2012).

Behind these mixed empirical findings, there are a few explanations. First, the studies apply different entrepreneurship measures (gross entry rate versus net entry rate). Second, they use different estimation techniques. The most popular are Vector AutoRegression (VAR) models (Koellinger & Thurik, 2012; Plehn-Dujowich, 2012; Baptista & Preto, 2007) or panel fixed effect models (Carree *et al.*, 2008; Fritsch *et al.*, 2015; Konon *et al.*, 2018). Third, many studies take into account the total number of new firms established neglecting industry heterogeneity (manifested by differences in the entry costs, the capital and knowledge requirements, etc.). Meanwhile, the relationship between unemployment and the creation of new companies is conditioned by:

- industry specific effects. Due to lower capital and knowledge requirements, an unemployment push effect is assumed to be stronger in

small-scale operational service businesses and for non-employers (self-employed) (Román *et al.*, 2013);

- territorial specificity. Lagged regions display a greater tendency to create new businesses as a way of improving the situation in the labour market (Huggins *et al.*, 2017);
- the scale of labour market problems. The push effect is temporary and is exhibited more strongly during recession periods (Tyrowicz & Nestorowicz, 2010).

The ambiguous results regarding the driving role of unemployment in new firm dynamics highlight the need for specific empirical investigation. In filling this research gap, in particular in relation to CEE economies, this paper investigates the effects of unemployment on business entry in Poland, a CEE country that is characterised by considerable regional development differences, visible also in relation to unemployment and business activity. Moreover, this research approach considers not only regional, but also industry-specific aspects, which provide further insights into the unemployment push hypothesis.

Research method

The main hypothesis of the paper assumes that increases in the unemployment rate have a positive effect on the subsequent rate of new business registration in Poland (*H1*). The unemployment push effect is expected to be stronger in operational services (*H2*).

In order to capture the heterogeneous phenomenon of entrepreneurship (differences in qualifications and capital requirements), based on the Polish Activity Classification PKD 2007 (NACE Rev. 2-compatible), the following business sectors were distinguished: manufacturing (section C), construction (F), and the main representatives of service activities, namely operational services — wholesale and retail (G), hotels and restaurants (H), and knowledge-based business-oriented services — financial and insurance (J) services. As a proxy of entrepreneurship (Y_i), the gross entry rate into entrepreneurship (the number of newly registered businesses in a specific PKD section per 1,000 workers) was adopted. This indicator has the advantage of reflecting more precisely the effect of macro-variables on entrepreneurship (Fritsch *et al.*, 2015).

The analyses were performed at the regional NUTS-2 level. The main explanatory variable is registered unemployment rate (X_j)². Additionally,

² As a robust check LFS (Labour Force Survey)-based unemployment rate was also con-

regional GDP growth rate was also considered as an important macroeconomic factor of business activity. In order to reflect region-specific factors of new firm formation, the following control variables were included in the analysis:

Z_1 – the share of people with tertiary education (proxy of the human capital endowment) (Audretsch *et al.*, 2008)

Z_2 – the number of patents per 1,000 workers (proxy of research output and knowledge spillovers) (Konon *et al.*, 2018)

Z_3 – Local Human Development Index (as a proxy of overall socio-economic development and access to funding) (Huggins *et al.*, 2017)

Z_4 – share of services in the regional employment structure (proxy of the specialisation of the regional economy) (Román *et al.*, 2013)

Z_5 – total number of registered businesses per worker (proxy of the entrepreneurial climate) (Carree *et al.*, 2011)

Z_6 – average monthly gross wages in relation to the national average (proxy of opportunity costs of self-employment)

Z_7 – the share of unemployed granted the self-employment support from the Labour Fund (proxy for active labour market policy) (Srhoj & Zilic, 2020).

In order to verify the links between unemployment rate and business entry rate, a fixed effect panel³ approach was applied. This allows to capture unobserved regionally specific conditions for business activity, which also limits the omitted variable bias. The following regression equation was employed (1):

$$Y_{ij,t} = \alpha_0 + \alpha_i X_{j,t-1} + \beta_i GDP_{gr,t-1} + \gamma_i Z_{j,t-1} + \mu_{j,t} + \varepsilon_{j,t} \quad (1)$$

where:

i	type of industry;
j	region (NUTS-2);
t	year;
Y	gross entry rate;
X	unemployment rate;
GDP_{gr}	GDP growth rate;
Z	set of control variables;
$\alpha_0, \alpha_i, \beta_i, \gamma_i$	regression coefficients,
$\mu_{j,t}$	fixed effects,
$\varepsilon_{j,t}$	error term of the specification.

sidered.

³ The results of the Hausman test ($p < 0.001$) confirm the validity of this estimation method.

The parameters of the regression equation were estimated using Driscoll-Kraay fixed effects estimators, as they are robust with regard to very general forms of cross-sectional, spatial and temporal dependence (Hoechle, 2007). As the Breitung and CADF Pesaran panel unit root tests reveal, the levels of explanatory variables (except GDP growth rate) are not stationary; they are included in the regression equation in first differences (a dependent variable is included in the logarithmic form in order to improve its distribution in terms of normal distribution).

A fixed effect estimator, however, is unable to solve fully an endogeneity problem, which results from the two-way relationship between unemployment and entrepreneurship. In order to reduce possible endogeneity problems, the explanatory variables were included into the regression equation with a time lag of one period (Fritsch *et al.*, 2015). Moreover, as a robustness check, equation (1) was re-estimated using the p-VAR estimators that are designed for the presence of endogenous variables. In the p-VAR approach, all variables (gross entry rate, unemployment rate and GDP growth rate) are treated as endogenous. In addition, the p-VAR method retains the advantages of the panel data approach, as it recognises the unobserved individual heterogeneity (by introducing fixed effects), which results in improved consistency of estimation (Abrigo & Love, 2016). For comparability reasons, the first-order three-variable p-VAR model was estimated, in which the current level of each variable was explained by its own past and by past observations of the other variables.

The present study focuses on the short-term one-way effects of unemployment on new business registration. It ignores the reverse effect of entrepreneurship on the labour market. First, a longer time frame is required in order to detect the feedback effect that newly registered businesses have on employment (Fritsch *et al.*, 2015). Second, the main focus of the research is the incentives to start a business generated by unemployment. Thus, the applied research methods allow for the verification of the research hypotheses.

Results

Start-up activity in Poland varied across industries, regions and over time. In the period 2003–2020, an average of 13.1 new businesses (per 1,000 workers) was registered per year (Figure 1). Most of them (75%) were established in the service sector (9.8). In manufacturing, the average registration rate per year was lower, about 1.0 (ca 8% of all registrations) and in construction it was 2.0 (16.5%). Considering the specific groups of service

activity, the leader was the wholesale and retail section with an average entry rate of 3.2 (23.4%), followed by hotel and restaurant (H) businesses (albeit with a nearly six times lower registration rate 0.52; 4%). Relatively fewer new businesses were formed in business-oriented financial services (0.45; 3.4%).

The numbers of new business registrations also fluctuated over time. During 2003–2020, three sub-periods could be distinguished which correspond with macroeconomic fluctuations (Figure 2):

1. 2003–2010. An upward trend in business entry rate from 9.8 in 2003 to 15.3 in 2010 corresponds with a decline trend in unemployment rate from 20% in 2003 to 9.5% in 2008 (expansion phase in business cycle)
2. 2011–2016. Stabilisation of business entry rate around the average level of 14.0 matches an upward trend of unemployment in 2009–2013 (economic stagnation during the global financial crisis)
3. 2017–2019. Gradual increase in gross entry rate (up to 15.7 in 2019) correlates with a decrease in unemployment rate (2014–2019) and an increase in GDP growth rate. All series ended in 2020 due to the Covid-19 pandemic.

The distribution of the business entry rate, as well as the unemployment rate, also varied across Polish regions (Figure 3). In terms of entrepreneurial activity, disparities between the western (business entry rates in the range of 12–16) and eastern regions (entry rates in the range of 9.5–11.5) are visible. The results of the correlation analysis ($r=-0.493$; $p<0.05$) indicate that fewer entrepreneurial regions generally exhibited a higher unemployment rate. If the changes in the unemployment rate (in t-1 period) are considered, however, the Pearson's correlation coefficient amounts to 0.150 ($p=0.013$), which suggests the presence of the unemployment push effect.

The estimation results (Tables 1 and 2) confirm that, in Poland, new business registrations were affected by unemployment changes. A rising unemployment rate contributed, *ceteris paribus*, to a subsequent increase of business entry rate (est. 1a). The results are statistically significant and robust to using LFS-based unemployment rate (est. 1b) and applying the p-VAR estimation technique (est. 1c).

The unemployment push effect was observed primarily in operational services (est. 4a-c; 5a-b) with a higher susceptibility of the gross entry rate to unemployment changes as compared to an all-industry measure. The analyses reveal, however, the heterogeneity of the service sector. Within operational services, the highest sensitivity of business entry rate to unemployment changes was noticed in commerce sector (est. 4a; 4c). However, the vulnerability of newly-established wholesale and retail businesses to unemployment decreases almost twice (to the level observed in the hotel

and restaurant section) when using LFS unemployment data (est. 4b). Furthermore, the estimation results for hotel and restaurant businesses, are not fully conclusive. While the Driscoll-Kraay estimations (5a-b) indicate the presence of the unemployment push effect, in the p-VAR estimations (5c), the effect of unemployment is not statistically significant.

In the knowledge-based business-oriented services, an increase in unemployment had no significant effect on the number of new financial service businesses (est. 6a-b). The results, however, are sensitive to the estimation technique. p-VAR estimation (6c) suggests a reverse, statistically significant negative effect of unemployment on the number of newly registered businesses.

Similarly, ambiguous estimation outcomes were obtained for construction (est. 3a-c). In the manufacturing segment, the number of new businesses was not statistically significantly impacted by the registered unemployment rate (est. 2a; 2c). The results, however, are sensitive to using LFS data. An increase in LFS-based unemployment rate had a positive effect on the number of newly-established manufacturing businesses (est. 2b).

In the spatial dimension the research results indicate that the relationship between entrepreneurship and unemployment might be also affected by region-specific factors. Unemployment played a more important role in starting up businesses in the central-eastern Polish regions (Podkarpackie, Lubelskie, Świętokrzyskie, Małopolskie, Łódzkie), as well as in Opolskie, and Lubuskie (Figure 4).

Discussion

For the overall entry rate, the analysis revealed correlations that are consistent with the unemployment push effect. In particular, entries into the wholesale and retail business were driven by unemployment changes and the higher vulnerability of entrepreneurship to labour market fluctuations. The results are largely consistent with those found in previous studies (e.g. Román *et al.*, 2013; Thurik *et al.*, 2008; Caliendo & Kritikos, 2010). The push effect in commerce is explained by generally lower barriers to entry (Carree, 2002). It is worth noting that these findings are in line with the research hypotheses.

These conclusions, however, are not valid for other representatives of operational services, namely for hotels and restaurants. The estimation results for this service section are not robust. The ambiguous results could be linked to the fact that, in this branch, location-related factors such as cultur-

al and economic attractiveness and tourism potential may be of greater importance than unemployment (Puciato, 2016).

The unemployment push-effect observed in operational services might be also reinforced by active labour market policy instruments (in particular by self-employment grants for unemployed individuals — est. 4a). According to the Polish Supreme Audit Office (2015), among the unemployed individuals who started their businesses based on the financial support from labour agencies prevailed the service businesses (72%), mostly operational service businesses, and wholesale and retail (23%). Most often, the beneficiaries (ca. 80%) were short-term unemployed (for a period not exceeding one year). Thus, it could be assumed that high long-term unemployment might mitigate “the push effect” (Calá, 2018).

The estimation results for the business-oriented financial services are also mixed. An increase in unemployment had either no significant or a negative effect on the number of new financial service businesses. Similar results were also found by Konon *et al.* (2018). They indicate that entry rates in financial services in the German economy have no statistically significant relationship with labour market fluctuations. Conversely, research conducted by Plehn-Dujowich (2012) demonstrates a positive Granger causal effect of unemployment on entrepreneurship in professional and business services, including financial services and construction. Altogether, as stated by Román *et al.* (2013), the unemployment push effect is not only sector-dependent, but also might be shaped differently for different EU regions. Thus, the explanatory power of international comparisons in this research area is limited.

The financial and insurance services are highly concentrated and feature very high barriers to entry. Furthermore, demand for these services remains relatively high during a market upturn (financing the investment needs of businesses) and during downturn periods (securing financial liquidity). These specific features of financial services may explain why the number of newly formed businesses in this section might be less affected by labour market shifts.

Entries in manufacturing also seem to be ambivalent towards unemployment changes. Starting a new business in this sector is more difficult and, thus, might be less prone to unemployment changes. The result, however, could be conditioned by the heterogeneity of manufacturing industries according to their size or level of technological intensity (Konon *et al.*, 2018). This issue requires further investigation.

As regards the territorial aspect, most of the Polish regions prone to occurrence necessity entrepreneurship are characterised by lower GDP per capita (70–80% of the national average), higher unemployment rates, high-

er than the national average (24%) share of wholesale and retail businesses in the structure of newly registered enterprises, and lower overall business entry rates. There are also historical reasons behind this regional pattern. The Polish central-eastern regions comprise areas that once belonged to the Russian or Austrian partition, in which the agrarian–modern type of society prevailed. This type of society is considered as weak entrepreneurially and focused rather on the redistribution of income than wealth-building (Cierniak-Szóstak, 2012).

Conclusions

The research results confirm the validity of the sectoral approach in exploring the effect of the unemployment rate on new firm dynamic. In the Polish economy, this effect is sector-dependent. Although the driving role of unemployment in new business formation could be observed at an all-industry level, the effect seems to be triggered by entry behaviours in the most populous group of new entrepreneurs, namely in operational services. Moreover, within this sector, only the findings for wholesale and retail businesses could be considered as robust. Thus, both research hypotheses were only partially confirmed.

The phenomena described by necessity and opportunity entrepreneurship do exist simultaneously across all industries and regions. The opportunity and necessity motives, however, do not always balance each other. The results suggest a larger presence of necessity entrepreneurship within wholesale and retail. Moreover, the formation of new businesses in less developed regions seems to be more affected by unemployment rate changes. This might have an impact on the quality of entrepreneurship and its socio-economic outcomes. In these regions, it may be more difficult to achieve sustainable development goals by stimulating entrepreneurship. The results highlight the importance of developing the business support environment (e.g. business incubators, business mentoring and financial support), as well as promoting active entrepreneurial attitudes, in particular in less developed regions. These conditions are crucial if entrepreneurship is to be an effective tool in inducing long-term economic development in lagged areas.

The study has some limitations both in terms of data availability (the time series length, the annual frequency of data as well as data availability for the specific covariates), and also the implications this has for the estimation technique. The study does not capture the lagged influence of unemployment rate on new firm formation and focuses on the short-term one-

way effects of unemployment on new business registrations. Furthermore, the research neglects the sector specific factors of entrepreneurship. Meanwhile, the ambiguous results for manufacturing, construction and business-oriented services might be linked to the explanatory power of industry-specific factors. For comparability reasons, the present study utilised a constant set of control (region-specific) variables. Thus, further research should focus on more detailed analyses of specific groups of business activity. The comprehensive approach requires, however, collecting additional individual-level data revealing the motivations determining business formation across business sections.

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Annex

Table 1. Fixed effect Driscoll-Kraay estimates of equation (1) (N=192)

Estim. Y_i	1a All	2a Manufac.	3a Construc.	4a Wholesale	5a Hotels	6a Finance
Const.	2.59*** (0.03)	0.077** (0.03)	0.745*** (0.060)	1.16*** (0.035)	-0.658*** (0.056)	-0.852*** (0.053)
<i>Unemployment rate</i>	0.013* (0.0087)	0.018 (0.011)	-0.021 (0.018)	0.070*** (0.017)	0.032*** (0.006)	0.042 (0.023)
<i>GDP gr.</i>	-0.008 (0.006)	-0.009 (0.007)	-0.004 (0.010)	0.017** (0.006)	-0.010 (0.011)	0.032** (0.011)
<i>Human capital</i>	0.013 (0.008)	0.003 (0.009)	-0.002 (0.013)	0.024*** (0.007)	0.010 (0.008)	0.024* (0.013)
<i>Patents</i>	-0.127 (0.168)	-0.347* (0.158)	-0.058 (0.332)	0.064 (0.170)	-0.146 (0.201)	0.119 (0.219)
<i>LHDI</i>	-2.55 (1.81)	1.13 (2.60)	-2.49 (3.46)	-3.032* (1.732)	-2.82 (2.94)	-0.948 (3.79)
<i>Share of services</i>	1.62* (0.86)	2.15** (0.86)	3.35 (2.04)	-0.682 (1.42)	0.039 (0.86)	-0.252 (2.09)
<i>Registered businesses</i>	0.007 (0.010)	-0.006 (0.007)	0.011 (0.015)	-0.016** (0.007)	-0.003 (0.011)	-0.026* (0.014)
<i>Gross wages</i>	0.263 (0.450)	-0.683 (1.08)	0.473 (1.58)	-0.529 (1.40)	-0.131 (0.854)	-0.541 (1.53)
<i>Active labour market policy</i>	-1.174 (0.90)	1.858 (1.23)	0.479 (2.09)	4.90** (1.80)	0.655 (1.71)	6.23** (2.79)
within R ²	0.292	0.270	0.108	0.447	0.240	0.224
F-test (p-value)	0.0002	0.000	0.010	0.000	0.000	0.000
Estim.	1b	2b	3b	4b	5b	6b
<i>Z_i covariates included but not reported</i>						
<i>LFS unemployment rate</i>	0.018* (0.009)	0.016* (0.007)	0.002 (0.014)	0.032** (0.014)	0.034*** (0.006)	0.005 (0.016)
within R ²	0.323	0.268	0.083	0.253	0.259	0.157
F-test (p-value)	0.000	0.000	0.002	0.001	0.000	0.002

Notes: *, **, *** indicate statistical significance: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Drisc/Kraay standard errors in parentheses. For all estimations: robust test for differing group intercepts: $p < 0.001$.

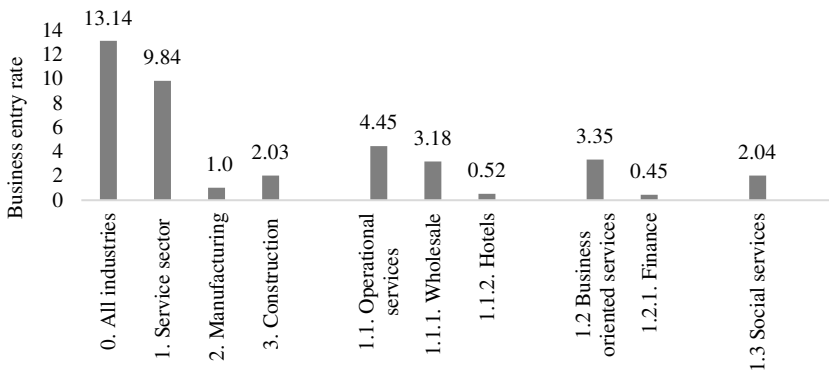
Table 2. Panel VAR estimates of equation (1) N=208

Variable	Entry rate	Unemp. rate <i>coeff. (robust st. er.)</i>	GDP gr.
Est. 1c: All			
<i>Entry rate</i> _{t-1}	-0.158 (0.099)	-0.263** (0.120)	0.659*** (0.120)
<i>Unemp. rate</i> _{t-1}	0.016** (0.055)	0.588*** (0.072)	-0.375*** (0.078)
<i>GDP gr.</i> _{t-1}	0.043 (0.066)	0.043 (0.092)	-0.026 (0.115)
Est. 2c: Manufacturing			
<i>Entry (t-1)</i>	0.056 (0.111)	-5.59*** (0.674)	6.45*** (0.814)
<i>Unemp(t-1)</i>	0.009 (0.007)	0.620*** (0.061)	-0.386*** (0.075)
<i>GDP(t-1)</i>	0.005 (0.010)	0.031 (0.084)	-0.021 (0.113)
Est. 3c: Construction			
<i>Entry rate</i> _{t-1}	-0.241** (0.116)	-0.637 (0.560)	2.63 (0.53)***
<i>Unemp. rate</i> _{t-1}	-0.046** (0.018)	0.498*** (0.080)	-0.040 (0.097)
<i>GDP gr.</i> _{t-1}	-0.012 (0.016)	0.048 (0.093)	-0.037 (0.124)
Est. 4c: Wholesale and retail			
<i>Entry rate</i> _{t-1}	-0.063 (0.094)	-0.918*** (0.261)	2.04*** (0.346)
<i>Unemp. rate</i> _{t-1}	0.086*** (0.023)	0.668*** (0.084)	-0.547*** (0.087)
<i>GDP gr.</i> _{t-1}	0.084*** (0.023)	0.081 (0.086)	-0.114 (0.112)
Est. 5c: Hotels and restaurants			
<i>Entry rate</i> _{t-1}	0.003 (0.095)	-0.698 (0.741)	0.634 (1.77)
<i>Unemp. rate</i> _{t-1}	-0.012 (0.008)	0.574*** (0.073)	-0.332*** (0.091)
<i>GDP gr.</i> _{t-1}	0.002 (0.007)	0.048 (0.093)	-0.042 (0.127)
Est. 6c: Financial services			
<i>Entry rate</i> _{t-1}	-0.159 (0.101)	5.81** (2.73)	0.220 (2.91)
<i>Unemp. rate</i> _{t-1}	-0.009*** (0.003)	0.579*** (0.079)	-0.325*** (0.088)
<i>GDP gr.</i> _{t-1}	0.020*** (0.004)	-0.060 (0.096)	-0.047 (0.144)

Notes: GMM estimation; local specific effects were eliminated prior to the estimation (Helmert transformation);

*, **, *** indicate statistical significance: * p < 0.1; ** p < 0.05; *** p < 0.01; robust standard errors in parentheses. All models meet stability conditions of panel VAR estimates (the modulus of each eigenvalue of the estimated model is less than one).

Figure 1. Business entry rate in specific industry sectors in Poland (2003–2020 average)



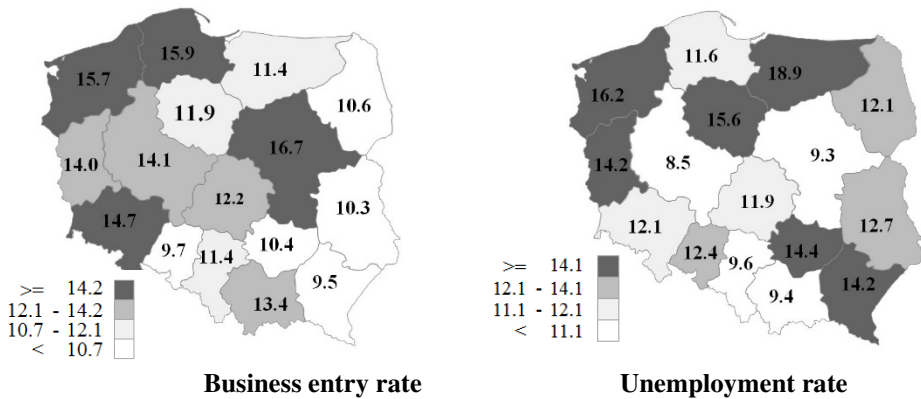
Source: own elaboration based on CSO data.

Figure 2. Annual number of business registrations versus unemployment rate and GDP growth in Poland (2003–2020)



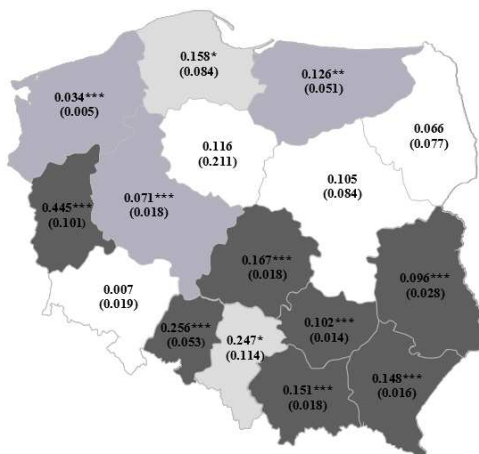
Source: own elaboration based on CSO data.

Figure 3. Spatial diversity of new business registrations and unemployment in Polish regions (2003–2020 average)



Source: own elaboration based on CSO data.

Figure 4. Unemployment push-effect in operational services (wholesale and retail) in Polish regions (2003–2018)



Notes: Drisc/Kraay estimates of coefficients at unemployment rate (standard errors in parentheses). *, **, *** indicate statistical significance: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Source: own elaboration based on CSO data.