

**An econometric analysis of
entrepreneurship determinants in
Polish voivodeships
in the years 2004-2013**

Tomasz Groszkowski Tomasz Stryjewski

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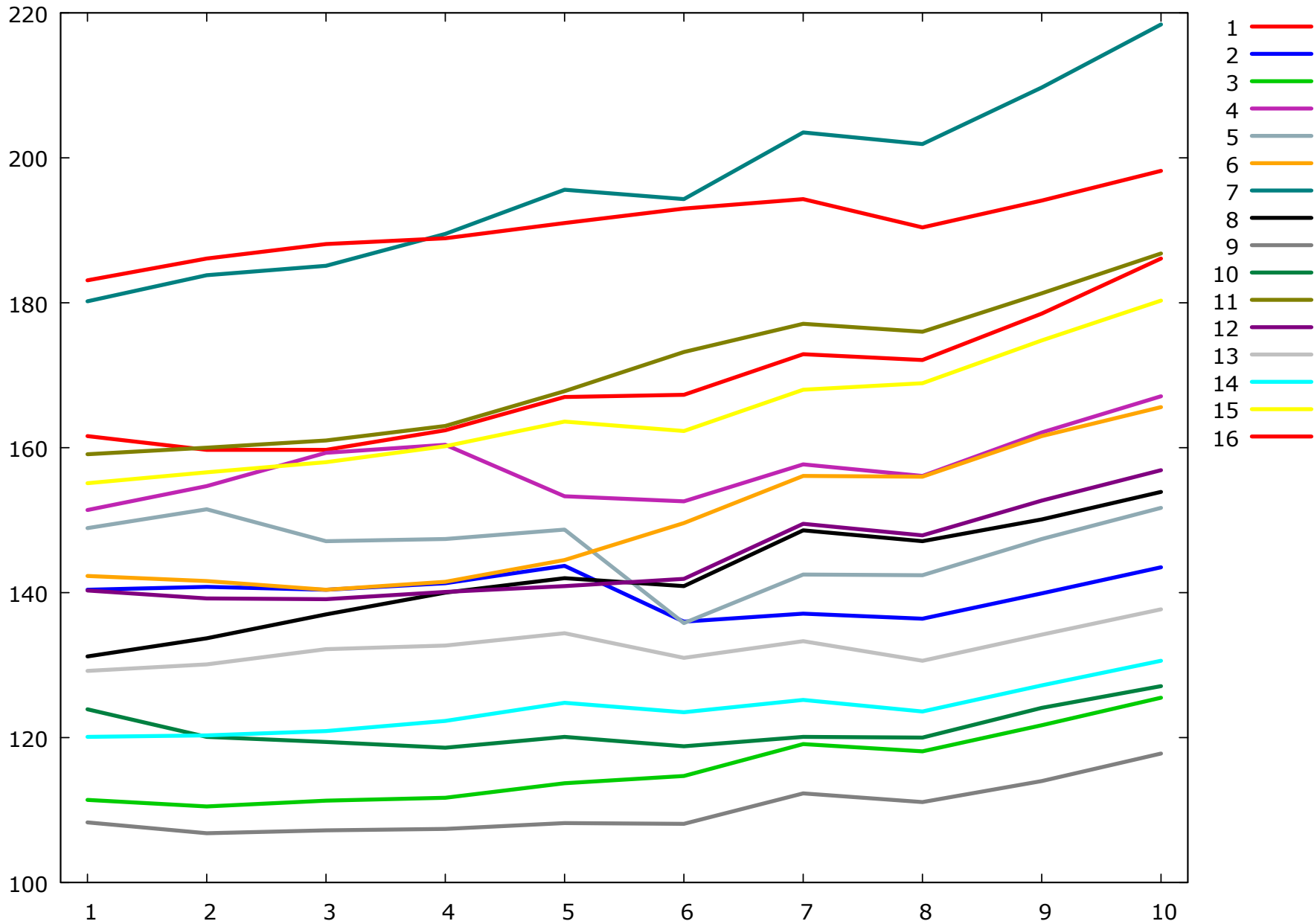
Our questions at the beginning of the analysis

- We all know the importance of companies in the economy - they are an essential element and driving force in the economy.
- The question is: what forces cause the entrepreneurship's dynamics and diversity over the regions?
- The next question is: what is the nature of these regional differences?

Base characteristics of the analysis

- The goal – to find out the factor which determine the level of the Enterprenuership Indicator in Poland and to find out reasons of its distribiution over the regions
- Sample – annual data form 2003 to 2013 for 16 regions
- Small sample limits the range of possible econometric analysis (degrees of freedom) to AR(1) model with linear trend

wskpz by group



The methodology

- We use panel models with particular emphasis on FE / RE class of models
- Because the dependent variable was highly autocorrelated we considered two models:
 - Autoregressive panel models
 - Model with instrumental variable as the lagged dependent variable

Partial results

- After verification both models proved to be similar.
- However, the test to autoregressive panel model showed no spatial differentiation.
- In our view, it is inconsistent with the observation of the Polish economy.
- To further study was used model with an instrumental variable.

The first part of analysis

- In the first step we searched instrumental variable among similar economic variables
- This search yielded no results
- In the next step we decided to create a instrumental variable in accordance with the model (dynamic panel models):

$$y_{it} = \alpha_0 + \alpha_1 y_{i,t-1} + \alpha_2 y_{i,t-2} + \alpha_3 t + \eta_{it}$$

Model for instrumental variable – empirical results

Dependent variable: wskpz

	<i>Coefficient</i>	<i>Std. Error</i>	<i>z</i>	<i>p-value</i>	
wskpz(-1)	0.983455	0.0384516	25.5764	<0.00001	***
const	1.47559	5.04465	0.2925	0.76990	
time	0.453335	0.112804	4.0188	0.00006	***

The second part of analysis

- In the next step of analysis a panel model for Entrepreneurship Index contains the lagged instrumental variable has been estimated
- Generally, the model has good characteristics concerning the autocorrelation of residuals

Panel Data Model

Dependent variable: wskpz

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	4.65273	3.59303	1.2949	0.19779	
urbanizacja	-16.5172	4.61591	-3.5783	0.00050	***
turyst_1	0.0624735	0.030029	2.0804	0.03958	**
doch per capita	0.00904603	0.0018206	4.9687	<0.00001	***
time	-0.433895	0.193242	-2.2453	0.02655	**
yhat17_1	0.9631	0.0297482	32.3751	<0.00001	***
R-squared	0.982392	Adjusted R-squared	0.981671		
rho	0.369602	Durbin-Watson	1.085559		

Panel model diagnostics

F test statistic (Fixed effect)		
the null hypothesis that the pooled OLS model is adequate, in favor of the fixed effects alternative	$F(15, 107) = 2.62918$	p-value = 0.00206261
Breusch-Pagan test statistic (Random effect)		
the null hypothesis that the pooled OLS model is adequate, in favor of the random effects alternative	$LM = 1.77137$	p-value = $\text{prob}(\text{chi-square}(1) > 1.77137) = 0.183213$
Hausman test statistic		
the null hypothesis that the random effects model is consistent, in favor of the fixed effects model	$H = 14.5289$	p-value = $\text{prob}(\text{chi-square}(5) > 14.5289) = 0.0125771$

Because of the panel data model with fixed effects contained irrelevant independent variables we decided to reestimate this model with use of the LSDV estimator

Empirical results of fixed effect panel model estimated by LSDV

Dependent variable: wskpz

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	31.9812	9.33634	3.4255	0.00086	***
dochodymieszk	0.00906773	0.00166157	5.4573	<0.00001	***
yhat17_1	0.700387	0.0728127	9.6190	<0.00001	***
LSDV R-squared	0.986830	Within R-squared	0.742696		
LSDV F(17, 110)	484.8430	P-value(F)	4.79e-95		
rho	0.274151	Durbin-Watson	1.193454		

Conclusions

The examination of Entrepreneurial activities through the index allow drawing three main conclusions:

- The problem of entrepreneurship development in Poland is a structural problem.
- Identified determinants of the entrepreneurship index in the researched period are:
 - municipal revenues per capita
 - entrepreneurship index in the previous period
- Entrepreneurship Index (The number of enterprises per 1,000 people of working age) – is it a good variable?

Thank You for Your
attention