# Entrepreneurship in Relation to the Competitive Potential and Position of Economies – a Regional Approach Based on Polish Provinces

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*SUMMARY*

*The aim of this study was to determine the influence of entrepreneurship on the competitiveness of regional economies, in particular on the competitive potential and position of regions. In order to do this, an empirical study of the Polish provinces was conducted. In order to achieve the aim of the study, regression function parameters were estimated by means of three methods: the classic method of least squares, the panel method with fixed effects and the panel method with random effects. Empirical confirmation was obtained for the first hypothesis, which assumed a positive impact of entrepreneurship on the competitive potential of a region. In particular, the findings lend support to the two related secondary hypotheses, which indicated a positive impact of the enterprise start-up rate (Hypothesis 1A) and enterprise density rate (Hypothesis 1B) on the competitive potential of a region. The issue of the impact of entrepreneurship on the competitive position of a region is less clear. One of the secondary hypotheses, which assumed a positive impact of the enterprise density rate on the competitive position (Hypothesis 2B) was confirmed by the findings. However, the enterprise start-up rate was found to have an adverse influence on the competitive position of regions, thus Hypothesis 2A has to be rejected.*

*Keywords: entrepreneurship, regional competitiveness, Poland*
*Journal of Economic Literature (JEL) code: L26, O40*

## INTRODUCTION

This article examines the determinants of regional competitiveness. Because in the vast majority of cases companies begin their business operations in a local market and later expand their activities to other markets, an analysis of local economic conditions seems to be extremely important.

Among the different factors that have an impact on regional competitiveness, the analysis concentrates on entrepreneurship understood in its narrow meaning as the process of creating and running a business enterprise. This issue is relatively rarely discussed, although according to the literature the relationship between entrepreneurship and competitiveness can be bidirectional (Audretsch & Pena-Legazkue 2012) and the findings of earlier research do not provide definitive answers regarding the direction and strength of those dependencies. Some studies indicate that entrepreneurial opportunities appear in the environment, whereas others argue that it is entrepreneurs who shape the environment (Edelman & Yli-Renko 2010).

To address this research problem, the article differentiates between competitive potential and competitive position. Entrepreneurial capital is an important regional asset (Audretsch & Pena-Legazkue 2012) and it can be considered as a factor which affects the competitive potential of a region. At the same time, a properly conducted entrepreneurial process influences a region's competitive position.

The article is divided into four sections. The first section explains the essence and meaning of competitiveness. The second contains a theoretical discussion of the role of entrepreneurship in shaping the competitive position and potential of a region. The third part presents the adopted research assumptions, including the research hypotheses and methods of empirical analysis. The final section includes the findings of the research, followed by concluding remarks.

# THE ESSENCE AND MEANING OF COMPETITIVENESS

Competitiveness is a multifaceted concept, which can be discussed on a national level or on an industry, enterprise or product level (Buckley et al. 1988; Flanagan et al. 2007), and each of those levels is significantly different from the others (Flanagan et al. 2007).

The multidimensionality of competitiveness means that many different definitions of it can be found in the literature, none of which having been universally accepted (Flanagan et al. 2007; Balkyte & Tvaronaviciene 2010). Some prominent global institutions adopt the following definitions (Fischer & Schornberg 2007):

- The OECD defines competitiveness as the ability of companies, industries, regions, nations or supra-regional economies to generate relatively high factor income and employment levels on a sustainable basis while being exposed to international competition,
- In the definition of the European Commission, competitiveness is the ability of an economy to provide a sustained rise in the standards of living for all the people who are willing to work,
- According to the definition adopted in the Global Competitiveness Report prepared by the World Economic Forum, competitiveness is a set of institutions, policies and factors which affect the level of productivity of a country (World Economic Forum 2011-2012, p. 4).

Competitiveness is also understood as a dynamic comparison between enterprises, industries or sectors in which the goods or services they produce can complement or compete with each other at certain points in order to achieve specific commercial or financial objectives. This comparison is continuous and dynamic, and it shows the evolution in the advantages of enterprises, industries or sectors over their competitors (Lombana 2011).

In another approach competitiveness is defined in the following ways, depending on the level of analysis (Buckley et al. 1988; Balkyte & Tvaronaviciene 2010):

- Competitiveness at the company level – a company is competitive if it is able to provide products or services of high quality and at lower prices than its national and international competitors,
- Competitiveness at the regional level – the ability of a region to use its competitive potential in order to achieve and maintain a competitive position over other regions,
- Competitiveness at the national level – the ability of a country to generate the resources necessary for fulfilling its national needs.

A particular form of national competitiveness is the international competitiveness of a country, traditionally explained on the basis of the theory of international trade (Balkyte & Tvaronaviciene 2010), or in a narrow sense as export competitiveness (Gorynia et al 2007b).

The concept of competitiveness is used to try and explain why some countries develop faster than others (Vares et al. 2011). The primary role of a nation is to create local conditions for the operation of companies. In the initial stages of existence, companies are usually dependent on local economic conditions, which shape their identity and determine access to resources (Grant 1991).

National competitiveness can be considered in two meanings (Thompson 2004):

- A narrow meaning, relating to cost conditions as determined by the exchange rate,
- A broader meaning, comprising the institutional and systemic circumstances of a business environment, for example the legal or political factors which influence business activities.

Another dimension of competitiveness is regional economies. The competitiveness of companies and the competitiveness of regions are interdependent concepts (Huggins 2003). The competitiveness of a region, both at the local and the regional level, is the ability of a specific sub-national economy to attract and retain companies which have a stable and/or growing market share, and to sustain a stable or growing standard of living for the population of the region (Huggins 2003). Regional competitiveness should also indicate the relative position of the companies from a given region in external markets, as well as the productivity and utilisation of local resources (Turok 2004). Additionally, regional competitiveness relates to how successfully regions compete against one another in order to win a share of the national or international markets (Kitson et al. 2004).

It is assumed that the foundations of regional competitiveness, measured by regional productivity, employment and the standard of living, comprise the manufacturing capital, human capital, social and institutional capital, cultural capital, infrastructure and knowledge (Kitson et al. 2004). The concept of competitiveness involves both efficiency, understood as the ability to achieve goals; and effectiveness, which means that goals are achieved at the lowest possible cost (O'Farrell et al. 1993).

There are several approaches and models for explaining competitiveness. The models derived from the works of Porter are considered to be mainstream models in the study of competitiveness although their critics point to some limitations such as a restricted possibility of widening the spectrum of analysis, focusing on the domestic sphere or the role of the government (Lombana 2011). Michael Porter's Five Forces model assumes that competitiveness is influenced by five forces and that basic competitive strategies exist (Porter 2006, pp. 31 and subsequent). On the other hand, Porter's National Diamond model enumerates the following pillars of competitiveness: factor conditions, demand conditions,

related and supporting industries as well as company strategy, structure and rivalry (Prasad 2011; Balkyte & Tvaronaviciene 2010; Ozgen 2011).

Other models of competitiveness are presented in the work of Ormanighi and Stringa (2008). The Structure-Conduct-Performance SCP) model assumes the impact of the structure of an industry on the conditions of conducting business, which affects the performance of companies. From the perspective of game theory, competitors are engaged in a specific game. The resource-based approach suggests that the efficiency of companies varies due to their different access to resources. And market process economics indicates that competitive advantage stems from a subjective assessment of profit potential, the creation and use of uncertainty as well as the coordination of learning and knowledge.

Another model of competitiveness, the 3P model, assumes the existence of three dimensions of competitiveness (Taggart & Taggart 1998):

- potential competitiveness – describes the inputs that can be made,
- process competitiveness – includes all the aspects of business operations through which competitive potential can change into competitive position,
- performance competitiveness – indicates the results of competitiveness.

With the introduction of aspects related to potential, process and position, competitiveness has become a coherent concept which can be integrated with management studies, economics or operations research (Flanagan et al. 2007).

The three dimensions of competitiveness interact with one another. Competitive potential influences the competitive position by making it permanent, and it influences the competitive process through generating resources which are necessary for management. Competitive process influences the position through managing the competitive potential, and it influences the potential through managing the decisions which determine the competitive potential. Finally, competitive position makes it possible to improve the competitive potential and the competitive process (Buckley et al. 1990). Competitive potential is connected with the inputs and competitive position is connected with the outputs (O'Farrell et al. 1993). Another study (Gorynia et al. 2007a) distinguishes between competitive potential and competitive position, just as in the 3P model, but the term competitive process is replaced by competitive strategy.

In the literature various measures are suggested to describe the dimensions of competitiveness as described by the 3P model; for example, the following measures can be used (Taggart & Taggart 1998; Buckley et al. 1990):

- potential competitiveness – labour costs, productivity, prices, research and development expenditure, commercialisation of research and development activities,
- process competitiveness – involvement in international business, marketing skills, economies of scale, internal and external relations,
- performance competitiveness – market share, share in exports market, dependence on exports, increase in exports, profitability.

Research findings also indicate that some measures of competitiveness seem to have values which are specific for given sectors, such as, for example, the volume and value of sales, sales growth, profitability and time- and cost-effectiveness as measures of competitive position; the quality of a product as a measure of competitive potential; and international orientation, management content or market orientation as measures of process competitiveness. Other measures may have a more universal nature, for instance employee's skills or relationships in key markets as measures of competitive potential, and the organisational structure, management styles and systems as measures of process competitiveness (Coviello et al. 1998). For a company to achieve a stable and balanced competitive situation it should be competitive in all the aspects of the 3P model (Taggart & Taggart 1998).

## THE ROLE OF ENTREPRENEURSHIP IN SHAPING THE COMPETITIVENESS OF A REGION – A THEORETICAL APPROACH

The present study focuses on the competitiveness of a regional economy. This dimension has been adopted because of the importance of local conditions for the operations of business enterprises. Typically, companies start to operate in local markets and only later do some of them begin the process of internationalisation (Grant 1991). Therefore, regional competitiveness is a phenomenon which is important in terms of both theory and practice.

One of the key dimensions of effective regional competitiveness is sustainable growth in employment. A key factor in achieving sustainable growth is maintaining a critical number of firms, measured by the saturation of an economy with enterprises, which helps generate new entrepreneurs and innovators in emerging sectors and markets as well as creating new jobs (Huggins, 2003).

There are two perspectives of regional competitiveness. The first is a microeconomic perspective, which involves the companies operating in a given region and their ability to produce goods in a stable and profitable manner, making it possible to meet the demand in an open economy. The second perspective is the result of macroeconomic competitiveness (Dimian & Danciv 2011).

This article assumes that entrepreneurship is a factor which influences regional competitiveness. Entrepreneurship, just like competitiveness, is a multi-faceted concept which remains outside the mainstream of neoclassical economics. Although research into entrepreneurship has been conducted for over half a century, there is still no single universally accepted definition or theory of this concept (Bygrave & Hofer 1991; Campbell 1992; Zachary & Mishra 2010); however, entrepreneurship is becoming an increasingly legitimate area of research (Hoskisson et al. 2011).

One problem of entrepreneurship studies is thought to be that fact that there is no clear conceptual basis; instead, research is based on various concepts derived from neoclassical equilibrium, psychology, and the Austrian school, as well as economic, cultural and socio-political schools (Murphy 2011). Entrepreneurship is analysed in historical, time, institutional, spatial and social contexts (Welter 2011). There are three principal research trends, in which entrepreneurship is understood as innovativeness (Schumpeter 1960; Hoskisson et al. 2011), risk-taking (Emmett 1999), or noticing and exploiting market opportunities (Kirzner 1997; Douhan et al. 2007). In the literature, entrepreneurship is equated with starting a business, innovation, seeking business opportunities, taking risks, seeking profit, making a new use of resources, obtaining and managing resources, creating value, company existence, taking initiatives, ownership, as well as the strategic development of an enterprise (Morris et al. 1994; Hoskisson et al. 2011). In a narrow sense, entrepreneurship is connected with the creation and development of an enterprise (Griffiths et al. 2012), whereas in a broad sense it is connected with its attributes and resources (Bridge et al. 2009, pp. 39-44].

This article has adopted a narrow definition of entrepreneurship, being the process of creating and running a company. Creating a new business is a complex process that involves a range of activities, such as identifying market opportunities, preparing a plan of action, and obtaining resources, as well as formalising the company and its further development through successive stages of growth (Gorzelany-Dziadkowiec & Gorzelany, 2007). In the course of the entrepreneurial process an idea is transformed into an operating company (Bratnicki 2008).

The relationships between entrepreneurship and regional competitiveness are not often analysed in the literature and they require further study (Audretsch & Pena-Legazkue 2012). Studies which examine the relationships between entrepreneurship and the environment present two opposing views: some claim that entrepreneurial opportunities emerge in the environment, whereas others argue that entrepreneurs shape the environment (Edelman &Yli-Renko 2010); sometimes it is said that a two-way relationship exists between these two categories (Audretsch & Pena-Legazkue 2012). Previous study has looked for a relationship between the location of new enterprises, the place of an entrepreneur's operations and entrepreneurship support policies (Trettin & Welter 2011). Moreover, it is indicated that the characteristics related to the location of businesses, especially access to local resources, affect their ability to implement innovation (Karlsen et al. 2011).

This study assumes that the level of entrepreneurship in a given region affects regional competitiveness, so entrepreneurial activity influences the environment. Adopting such an assumption stems from the observation that entrepreneurship is embedded in the social structure, and enterprises are part of a larger system consisting of other enterprises as well as society as a whole. A local community can be regarded as an important basis for developing entrepreneurial activity. Entrepreneurs are agents of change and organisers of the community development process (Spilling 2011). Entrepreneurial capital is a significant regional asset which can accelerate the transformation of a local economy through increased competition and regional productivity (Audretsch & Pena-Legazkue 2012). A region's greater capability of generating new knowledge and creating new enterprises are positively correlated with its level of competitiveness (Gonzalez-Pernia et al. 2012).

Market entries of new enterprises and the activity of the existing ones can influence the level of regional competitiveness through several channels. The appearance of new market entrants increases competition between companies and creates demand for skilled workers (Kitson et al. 2004), which has a positive impact on the competitiveness of the region. This positive impact can be attributed to two causes. The first one is a selection mechanism which prevents inefficient companies from surviving on the market, thus enabling new companies to enter. The second mechanism indicates that competition between enterprises forces existing companies to improve technologies or the organisation of their operations (Turok 2004). Thus, possible entries of new firms increase the efficiency of existing companies, which raises the competitive potential of a region.

Such a relationship can also be linked to the type of technological regime in a region, which affects the ways of introducing innovation to the market. There are two types of regimes: an entrepreneurial regime and a routinised regime. An entrepreneurial regime is characterised by a high number of new enterprises that introduce innovation into the market. In routinised regimes the start-up rate is relatively low, and innovation is implemented by existing companies (Audretsch & Fritsch 2002; Lin & Huang 2008; Peneder 2008). In an entrepreneurial regime there is creative destruction, which means that new companies enter the market and replace existing businesses; and in a routinised regime there is creative accumulation, which is characterised by a relatively stable number of companies. It is easier for new businesses to enter entrepreneurial regime markets because of lower entry barriers (Lin & Huang, 2008). It is believed that entrepreneurial regimes are characterised by

a greater increase in value added and in employment; however, labour productivity is lower than in routinised regimes (Peneder 2008).

The saturation of an economy with enterprises, which promotes the generation of new entrepreneurs and innovators, is considered to be one of the key factors for achieving effective regional competitiveness (Huggins 2003).

# THE IMPACT OF ENTREPRENEURSHIP ON THE POTENTIAL AND THE COMPETITIVE POSITION OF A REGION – RESEARCH ASSUMPTIONS

In view of what has been said above, the business environment can be regarded as one of the elements of the economic system of a region. Taking into account the bi-directionality of the possible interactions between entrepreneurship and competitiveness, it has been assumed that the entrepreneurial process connected with the appearance of new market entrants and the growth of existing firms affects the potential and the competitive position of economies at a regional level.

To justify this one can refer to the assumptions of neoclassical economics, especially the processes which shape the long-term situation in perfect competition (Mankiew & Taylor, 2009 pp. 386-388; Czarny & Nojszewska 2000, pp. 129-132; Varian 2001, p. 408 and subsequent). The more companies operate in a market and the lower their concentration, the easier it is for new companies to enter the market. This is because such a market more closely resembles the structure of perfect competition and consequently entry barriers are lower, there are better conditions for companies to make their mark, and the regional market is more open to new business enterprises. New market entrants affect the form of the supply function, which in the long term leads to the decline in prices to a level where profit is reduced to zero. Simultaneously, such a situation prompts companies to implement new solutions and look for the most efficient methods of utilising their resources in the search for profit. Competition between existing enterprises and the threat of new entries can thus affect the competitive potential and competitive position of a region.

Existing and newly created companies help improve the competitive potential of the region in which they operate through their influence on the inputs that can be made and utilised in the region's economy. On the one hand, enterprises obtain the factors of production which are necessary for their operations; on the other hand, they decide how to use them. It can therefore be assumed that the more developed entrepreneurship is in a region, the higher the region's competitive potential. The above dependencies lead to formulating the first research hypothesis.

### *Hypothesis 1: Entrepreneurship has a positive impact on the competitive potential of a region.*

Existing and emerging businesses influence the competitive position; that is, the results that a region achieves in comparison to other regions. Through managing their resources, companies generate economic benefits both for themselves and for cooperating groups of stakeholders. This is reflected in the overall economic performance of the region. The greater the number of efficient companies which operate in a region, the better the region's economic performance. The above observations lead to formulating the second research hypothesis.

### *Hypothesis 2: Entrepreneurship has a positive impact on the competitive position of a region.*

An empirical study was conducted in order to verify the research hypotheses relating to the positive impact of entrepreneurship on the competitive potential and position of regional economies. The study analysed the economies of 16 Polish regions. Based on data availability, for each of the economies the course of the variables was examined for the years 2003-2009 in yearly data. This means that for each region a time series of seven years was analysed. Altogether, 112 observations were used for each of the variables .

The impact of entrepreneurship on the competitive potential and position of economies was determined on the basis of the estimated parameters of regression function. It was assumed that the regression function is represented by the following regression equation

$$K = a_0 + a_1 MP_1 + \ldots + a_n MP_n \qquad (1)$$

where:

K – measures of competitiveness, including measures of both competitive potential and competitive position,

$MP_1 \ldots MP_n$ – measures of entrepreneurship from 1 to n,

$a_0$, $a_1 \ldots a_n$ – regression function parameters.

Because this study has adopted the narrow meaning of entrepreneurship as a process of enterprise creation and development, appropriate measures were applied which illustrate these processes. Initially, four measures of entrepreneurship were adopted:

- enterprise start-up rate (SR) – calculated as the percentage of newly registered enterprises in a given year in the total number of enterprises in each region,
- enterprise closure rate (CR) – measured as a percentage of deregistered companies in a given

- year in the total number of enterprises in each region,
- enterprise net rate (NR) – calculated as a percentage of the difference between new and deregistered companies in a given year in the total number of enterprises in each region,
- enterprise density rate (DR) – calculated as the number of enterprises per 1,000 inhabitants in each region.

In the absence of consensus with regard to competitiveness measures, this study refers to entrepreneurship studies which use the indicator approach. These include the Global Competitiveness Report produced by the World Economic Forum (Fischer & Schornberg 2007).

The Global Competitivness Report includes the Global Competitivness Index (GCI), which is influenced by 12 pillars, each indicating the determinants of competitiveness. These pillars depict such aspects of competitiveness as institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market sophistication, technological readiness, market size, business sophistication, and innovation (Global Competitiveness Report 2011-2012). Although the GCI is a comprehensive measure for competitiveness assessment, it presents an international perspective and there is no data relating to individual regions of a country. That is why the GCI could not be used for the purposes of this study.

It can be noted that the measures of entrepreneurship adopted in this study can be linked to the sixth pillar of competitiveness – the efficiency of the goods and services market. In the GCI one of the components of this pillar is domestic competition, which includes the number of new manufacturing enterprises and the time required to start a business. The measures of entrepreneurship adopted in this study (enterprise start-up rate, closure rate, net rate and density rate), although not entirely corresponding to the components used in the GCI, can be considered to present a broader picture of competition between enterprises.

Although Porter's five forces model evaluates the profitability of an industry and not of a region (Porter 2006, pp. 31 and subsequent; Prasad 2011), it can be seen that the adopted measures of entrepreneurship as determinants of competitiveness are associated with the threat of new market entries, which is one of the forces analysed in the model. Additionally, with regard to Porter's diamond of national advantage, the determinants adopted in this study relate to the part of the diamond which comprises the strategy of companies, their structure and rivalry (Balkyte & Tvaronaviciene 2010; Prasad, 2011).

To determine the competitive potential of individual regions, which involves the resources that can be utilised, the present study used the potential measures proposed in the 3P model (Taggart & Taggart 1998; Buckley et al. 1990). In particular, the following three measures were taken into account:

- Labour costs in PLN per one inhabitant (LC),
- Price dynamics, where the previous year is considered to be 100 (PD),
- Research and development expenditure in PLN per inhabitant (RDE).

Competitive position, in turn, which indicates the performance competitiveness of regions, was measured by means of two parameters: GDP per capita and disposable income. In the literature, net national income per capita, measured by purchasing power, is considered to be the most synthetic indicator of economic performance (Kowalski & Pietrzykowski 2010, pp. 30-31); however, in the Polish economy the differences in price levels are not very significant so correcting GDP with purchasing power is not necessary. GDP per capita is often used in studies as a measure of regional competitiveness (e.g. Dimian & Danciv 2011) which indicates the results and thus the competitive position of regions.

In the case of competitiveness measures this study took into account the ranking of regions' effectiveness, that is the relationship of GDP per capita and disposable income in a region to the level of these values in Poland, with the average value for Poland being 100. Thus, the following two measures for the competitive position of regions were adopted:

- A percentage deviation of GDP per capita in a given region from GDP per capita in Poland (GDP per capita, Poland = 100) (GDP)
- A percentage deviation of disposable income in a given region from disposable income in Poland (Disposable income, Poland = 100), (DI).

The denominator for most of the adopted indicators describing the competitive potential and position (LC, RDE, GDP, DI) is the population of a given province. This stems from the desire to obtain a common denominator for competitiveness measures and the enterprise density indicator (DR).

Because one of the adopted variables, the enterprise net rate (NR), can have both positive and negative values, it cannot be converted to natural logarithms. Therefore, to achieve the comparability of variables at this stage of the study, the decision was taken to keep the raw data; if only linear dependencies were to be analysed when creating regression functions, all the variables should be converted to natural logarithms.

In order to eliminate the collinearity of independent variables, correlations between the variables were examined (see Table 1).

*Table 1*
*The correlation coefficient between variables*

| | GDP | DI | LC | PD | RDE | SR | CR | NR | DR |
|---|---|---|---|---|---|---|---|---|---|
| GDP | | 0.954 | 0.808 | -0.021 | 0.807 | -0.134 | -0.185 | 0.155 | 0.732 |
| DI | 0.954 | | 0.766 | -0.027 | 0.707 | -0.126 | -0.137 | 0.098 | 0.757 |
| LC | 0.808 | 0.808 | | 0.333 | 0.830 | 0.281 | 0.152 | -0.022 | 0.605 |
| PD | -0.021 | -0.027 | 0.333 | | 0.127 | 0.206 | 0.296 | -0.252 | 0.043 |
| RDE | 0.807 | 0.707 | 0.830 | 0.127 | | 0.076 | -0.018 | 0.070 | 0.459 |
| SR | -0.134 | -0.126 | 0.281 | 0.206 | 0.076 | | 0.643 | -0.209 | 0.053 |
| CR | -0.185 | -0.137 | 0.152 | 0.296 | -0.018 | 0.643 | | -0.883 | -0.117 |
| NR | 0.155 | 0.098 | -0.022 | -0.252 | 0.070 | -0.209 | -0.883 | | 0.182 |
| DR | 0.732 | 0.757 | 0.605 | 0.043 | 0.459 | 0.053 | -0.117 | 0.182 | |

Source: own compilation

From the point of view of estimating the regression function parameters, it is important to exclude those variables which have a high correlation. Out of the four independent variables adopted (SR, CR, NR, DR), there is a high positive correlation between the start-up rate (SR) and the closure rate (CR) (0.643). Therefore, enterprise closure rate (CR) was discarded as an independent variable and only three measures of entrepreneurship were used in further research procedures: enterprise start-up rate (SR), enterprise net rate (NR) and enterprise density rate (DR).

## THE IMPACT OF ENTREPRENEURSHIP ON THE COMPETITIVENESS OF REGIONS – RESEARCH FINDINGS

The next research step, following the correlation analysis (see Table 1), was the estimation of regression function parameters according to Equation (1). The dependent variables were the measures of competitive potential and competitive position, and the independent variables were the measures of entrepreneurship. First, the classic method of least squares was used to estimate the level of significance (p value) for each of the parameters (see Table 2).

Out of the 5 regression functions (see Table 2) estimated during the second research step, in 4 cases the parameters for the independent variable enterprise net rate (NR) turned out to be not statistically significant (for the dependent variables GDP, DI, LC and RDE), and for the fifth function (dependent variable PD) this parameter was again significant with a lower level of significance than the level adopted in this study (the threshold of significance adopted in this study is at the value of $p<0.01$, whereas in the analysed case the value was $p=0.016$). Therefore it was concluded that there is no basis for adopting the enterprise net rate as an independent variable influencing competitiveness, and this variable was excluded from further analysis.

*Table 2*
*Regression function parameters calculated by means of the classic method of least squares using raw data*

| Dependent variable | Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|---|
| GDP | Constant | 24.805 | 11.794 | 2.103 | 0.038 |
| | SR | -3.163 | 1.169 | -2.706 | 0.008 |
| | NR | -0.191 | 0.728 | -0.262 | 0.794 |
| | DR | 0.991 | 0.086 | 11.480 | 0.000 |
| DI | Constant | 52.712 | 6.799 | 7.753 | 0.000 |
| | SR | -2.002 | 0.674 | -2.972 | 0.004 |
| | NR | -0.549 | 0.419 | -1.309 | 0.193 |
| | DR | 0.631 | 0.050 | 12.67 | 0.000 |
| LC | Constant | -4439.980 | 1743.390 | -2.547 | 0.012 |
| | SR | 538.332 | 172.754 | 3.116 | 0.002 |
| | NR | -120.471 | 107.549 | -1.120 | 0.265 |
| | DR | 105.030 | 12.764 | 8.228 | 0.000 |
| PD | Constant | 100.802 | 1.020 | 98.780 | 0.000 |
| | SR | 0.164 | 0.101 | 1.626 | 0.107 |
| | NR | -0.154 | 0.063 | -2.446 | 0.016 |
| | DR | 0.006 | 0.007 | 0.830 | 0.409 |
| RDE | Constant | -245.301 | 90.850 | -2.700 | 0.008 |
| | SR | 5.324 | 9.002 | 0.591 | 0.556 |
| | NR | -0.172 | 5.604 | -0.031 | 0.976 |
| | DR | 3.484 | 0.665 | 5.238 | 0.000 |

Source: own compilation

On completion of the second research stage, two variables were finally adopted as independent variables, the enterprise start-up rate (SR) and the enterprise density rate (DR). This allows us to analyse the influence of entrepreneurship both from the point of view of entrepreneurial potential, measured by the start-up rate (SR), and from the point of view of entrepreneurial results, measured by enterprise density (DR).

Adopting these two dependent variables makes it possible to refine the research hypotheses. Hypothesis 1, which concerns the positive impact of entrepreneurship on the competitive potential of a region, has been modified by adding two specific hypotheses.

Hypothesis 1A: Enterprise start-up rate has a positive impact on the competitive potential of a region.

Hypothesis 1B: Enterprise density rate has a positive impact on the competitive potential of a region.

By analogy, the second research hypothesis, which concerns the positive impact of entrepreneurship on the competitive position of a region, has been modified by formulating two specific hypotheses.

Hypothesis 2A: Enterprise start-up rate has a positive impact on the competitive position of a region.

Hypothesis 2B: Enterprise density rate has a positive impact on the competitive position of a region.

After enterprise closure rate and enterprise net rate had been excluded from the set of analysed variables, it was possible to convert all the remaining variables to natural logarithms. When this had been done, the parameters of the regression function were estimated according to the initial form of Equation (1) by means of three consecutive methods: the classic method of least squares, the panel method with fixed effects, and the panel method with random effects.

*Table 3*
*Regression function parameters for GDP per capita as a dependent variable*

| Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|
| Classic method of least squares | | | | |
| Constant | 0.671 | 0.337 | 1.988 | 0.049 |
| SR | -0.221 | 0.078 | -2.817 | 0.006 |
| DR | 0.947 | 0.067 | 14.040 | 0.000 |
| Panel method with fixed effects | | | | |
| Constant | 4.025 | 0.317 | 12.700 | 0.000 |
| SR | -0.050 | 0.016 | -3.148 | 0.002 |
| DR | 0.127 | 0.073 | 1.744 | 0.084 |
| Panel method with random effects | | | | |
| Constant | 3.559 | 0.319 | 11.170 | 0.000 |
| SR | -0.060 | 0.017 | -3.582 | 0.001 |
| DR | 0.235 | 0.073 | 3.230 | 0.002 |

Source: own compilation

When analysing the results of estimating the parameters of the regression function for GDP per capita as a dependent variable by the use of three methods, it can be observed that irrespective of the method of estimation, the enterprise start-up rate (SR) is inversely proportional and the enterprise density rate is directly proportional to GDP. In all the methods of estimation, both the independent variables have a statistically significant impact on the dependent variable (see Table 3).

Comparing the absolute values of the estimated parameters, it can be assumed that the enterprise density rate of an economy has a greater impact on GDP per capita than the start-up rate.

*Table 4*
*Regression function parameters for disposable income (DI) as a dependent variable*

| Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|
| Classic method of least squares | | | | |
| Constant | 2.097 | 0.216 | 9.717 | 0.000 |
| SR | -0.126 | 0.050 | -2.507 | 0.014 |
| DR | 0.599 | 0.043 | 13.880 | 0.000 |
| Panel method with fixed effects | | | | |
| Constant | 3.823 | 0.187 | 20.500 | 0.000 |
| SR | -0.030 | 0.009 | -3.175 | 0.002 |
| DR | 0.173 | 0.043 | 4.038 | 0.000 |
| Panel method with random effects | | | | |
| Constant | 3.618 | 0.185 | 19.540 | 0.000 |
| SR | -0.034 | 0.010 | -3.536 | 0.001 |
| DR | 0.221 | 0.042 | 5.226 | 0.000 |

Source: own compilation

Another dependence which was examined, using the same three methods of estimating regression function parameters, was the influence of entrepreneurship on the disposable income of the population (see Table 4). In all three cases it was found that the start-up rate (SR) inversely influences and the density rate (DR) directly influences the disposable income of the population. The DR variable turned out to be statistically significant in all the analysed cases with the adopted level of significance ($p<0.01$). The ST variable is statistically significant at the adopted level of significance ($p<0.01$) in the case of the panel method with random and fixed effects; however, in the case of the classic method of least squares this variable is significant at a lower threshold of significance ($p=0.014$).

The absolute values of the estimated parameters indicate that the enterprise density rate is a factor which has a greater influence on the disposable income of the population than the business start-up rate.

Next, the influence of entrepreneurship on labour costs per capita (see Table 5) was analysed using the three methods of estimating the parameters of the regression function. Both measures of entrepreneurship, enterprise start-up rate (SR) and enterprise density rate (DR), in the case of all the regression functions, turned

out to have a directly proportional and statistically significant influence on labour costs.

*Table 5*
*Regression function parameters for labour costs per capita (LC) as a dependent variable*

| Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|
| Classic method of least squares | | | | |
| Constant | 3.889 | 0.516 | 7.537 | 0.000 |
| SR | 0.549 | 0.120 | 4.586 | 0.000 |
| DR | 0.907 | 0.103 | 8.797 | 0.000 |
| Panel method with fixed effects | | | | |
| Constant | -1.463 | 1.237 | -1.183 | 0.240 |
| SR | 0.925 | 0.062 | 14.840 | 0.000 |
| DR | 1.921 | 0.284 | 6.759 | 0.000 |
| Panel method with random effects | | | | |
| Constant | 1.280 | 0.834 | 1.535 | 0.128 |
| SR | 0.960 | 0.063 | 15.34 | 0.000 |
| DR | 1.298 | 0.190 | 6.833 | 0.000 |

Source: own compilation

A comparison of the absolute values of the estimated parameters indicates that, similarly to the previous regression functions, business density rate is a factor which exerts a greater influence on labour costs than does the business start-up rate.

*Table 6*
*Regression function parameters for price dynamics (PD) as a dependent variable*

| Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|
| Classic method of least squares | | | | |
| Constant | 4.588 | 0.034 | 135.200 | 0.000 |
| SR | 0.015 | 0.008 | 1.946 | 0.054 |
| DR | 0.002 | 0.007 | 0.324 | 0.747 |
| Panel method with fixed effects | | | | |
| Constant | 4.054 | 0.213 | 19.020 | 0.000 |
| SR | 0.016 | 0.011 | 1.448 | 0.151 |
| DR | 0.120 | 0.049 | 2.459 | 0.016 |
| Panel method with random effects | | | | |
| Constant | 4.588 | 0.034 | 135.200 | 0.000 |
| SR | 0.015 | 0.008 | 1.946 | 0.054 |
| DR | 0.002 | 0.007 | 0.324 | 0.747 |

Source: own compilation

The next research step was to determine the influence of entrepreneurship on the price dynamics in each region (see Table 6). However, in none of the three methods for estimating the parameters of the regression function did the parameters of both measures of entrepreneurship, enterprise start-up rate (SR) and enterprise density rate (DR), reach the adopted level of significance ($p<0.01$). Thus there are no grounds for confirming the influence of entrepreneurship on price dynamics.

The final stage of the research was to examine the impact of entrepreneurship on research and development expenditure per inhabitant (see Table 7) using the three adopted methods of estimating regression function parameters. All the regression functions showed that both measures of entrepreneurship – the start-up rate (SR) and the density rate (DR) – have a directly proportional influence on research and development expenditure. However, the statistical significance of this relationship is unclear. In half of the cases (three out of six) the assumed significance threshold was reached, in two other cases the p values marginally exceeded the target level ($p=0.019$; $p=0.018$), and in the last case the significance level was at the value of $p=0.059$. This means that if a lower level of significance ($p=0.1$) is accepted, all the variables can be considered significant, but with the assumed threshold in half the cases the variables did not reach the target level.

*Table 7*
*Regression function parameters for research and development expenditure (RDE) as a dependent variable*

| Independent variables | Parameter value | Standard error | t-distribution | p value |
|---|---|---|---|---|
| Classic method of least squares | | | | |
| Constant | -5.822 | 2.136 | -2.725 | 0.008 |
| SR | 1.183 | 0.496 | 2.386 | 0.019 |
| DR | 1.731 | 0.427 | 4.052 | 0.000 |
| Panel method with fixed effects | | | | |
| Constant | -7.697 | 4.363 | -1.764 | 0.081 |
| SR | 1.683 | 0.220 | 7.654 | 0.000 |
| DR | 1.918 | 1.003 | 1.913 | 0.059 |
| Panel method with random effects | | | | |
| Constant | -7.345 | 3.313 | -2.217 | 0.029 |
| SR | 1.679 | 0.210 | 8.006 | 0.000 |
| DR | 1.842 | 0.757 | 2.432 | 0.017 |

Source: own compilation

Similarly, as in the case of the dependencies which were analysed earlier, on the basis of the absolute values of the estimated parameters it can be stated that the impact of enterprise density on research and development expenditure is greater than the impact of start-up rate. This time, however, the difference in the strength of the impact is smaller than it was in the previous instances.

In conclusion, it is evident that the results of the analyses have confirmed the impact of the two measures of entrepreneurship, enterprise start-up rate and enterprise density rate, on both the potential and the competitive position of regions.

Both the adopted measures of entrepreneurship exert a positive influence on the competitive potential of regions. The start-up rate, which depicts the scale of new businesses entering the market, has a directly proportional influence on labour costs and on prices, as well on as research and development expenditure. A greater number of new market entrants increases competition for resources, including human capital. This produces an increase in labour costs, resulting from salary-based forms of attracting new employees, as well as an increase in price dynamics. At the same time, a higher start-up rate forces all the market operators to look for innovative solutions, which leads to an increase in research and development expenditure.

The rate of enterprise density also has a favourable influence on the competitive potential of a region. The

greater the enterprise density in a given economy, that is the greater the number of businesses per 1,000 inhabitants, the more intense the competition between them for the factors of production, including human capital. This results in higher labour costs and greater price dynamics. At the same time, a greater density of enterprises prompts them to look for new solutions, which increases the level of research and development expenditure.

It is worth noting that the adopted measures of entrepreneurship exert the strongest influence on research and development expenditure and the weakest on price dynamics.

Consequently, the findings of this part of the research provide confirmation for the first research hypothesis, which assumed a positive impact of entrepreneurship on the competitive potential of a region. The findings also provide support for accepting the two specific hypotheses, which assumed a positive impact of enterprise start-up rate (Hypothesis 1A) and enterprise density rate (Hypothesis 1B) on the competitive potential of a region.

The situation is somewhat different as regards the influence of entrepreneurship on the competitive position of regional economies. It was discovered that during the analysed period one of the measures of entrepreneurship, the enterprise start-up rate, had an adverse effect on the competitive position, whereas the second measure, the enterprise density rate, had a positive effect on the competitive position of regions.

The enterprise start-up rate depicts the scale of new market entries. Thus it is a form of human, especially entrepreneurial, and financial capital investment in new business activity. However, not all new companies are able to survive in the market, and enterprise closure rates (see Table 1) show what proportion of new business enterprises fail. In the short term a large scale of new entries can be a burden on the economy of a region and can lead to a deterioration in its competitive position, and only the activity of businesses that manage to survive in the market – depicted in the form of the enterprise density rate – has a positive impact on the competitive position of a regional economy.

The above findings do not provide sufficient grounds for accepting in its entirety the second hypothesis, which assumed a positive impact of entrepreneurship on the competitive position of a regional economy. As regards the secondary hypotheses, there are no grounds for accepting Hypothesis 2A, which assumed a positive impact of the enterprise start-up rate on the competitive position of a region. However, empirical findings provide confirmation for Hypothesis 2B, which assumed a positive impact of the enterprise density rate on the competitive position of a region.

## CONCLUSIONS

The aim of this study was to determine the influence of entrepreneurship on the competitiveness of regional economies, in particular on the competitive potential and position of regions. In order to do this, an empirical study of the Polish provinces was conducted. The study used yearly data pertaining to the subject of the research for the years 2003-2009. Panel data were created, which showed the value of the adopted indicators for 16 regions over the period of 7 years, which produced 112 observations for each of the variables. In order to achieve the aim of the study, regression function parameters were estimated by means of three methods: the classic method of least squares, the panel method with fixed effects and the panel method with random effects.

The findings of the research were then related to the research hypotheses. Empirical confirmation was obtained for the first hypothesis, which assumed a positive impact of entrepreneurship on the competitive potential of a region. In particular, the findings lend support to the two related secondary hypotheses, which indicated a positive impact of the enterprise start-up rate (Hypothesis 1A) and enterprise density rate (Hypothesis 1B) on the competitive potential of a region.

The issue of the impact of entrepreneurship on the competitive position of a region is less clear. One of the secondary hypotheses, which assumed a positive impact of the enterprise density rate on the competitive position (Hypothesis 2B) was confirmed by the findings. However, the enterprise start-up rate was found to have an adverse influence on the competitive position of regions, thus Hypothesis 2A has to be rejected.

The above findings provide a basis for further research. It seems essential to verify the findings obtained in this study with regard to the regional economies of other countries. An important aspect for future research also seems to be the issue of a time delay in the impact of entrepreneurship on regional competitiveness, particularly on the competitive position. It seems possible that entrepreneurship, especially as expressed through new firm creation, affects the competitive position of a region with a certain time lag, resulting from the fact that new businesses need time before they are able to produce economic results.

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