

Human Development and Quality of Institutions in Highly Developed Countries

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Abstract The article concentrates on the problem of influence of quality of institutional system in the context of utilizing the potential of knowledge-based economy (KBE) on the human development in highly developed countries. In order to measure the quality of institutional system, a synthetic measure based on multivariate analysis techniques was proposed. To obtain the institutional measure, TOPSIS method was applied. To quantify the institutional factors, the data from Fraser Institute was used. As diagnostic variables of quality of institutions, 29 variables qualified to four aspects of national institutional systems were used: (a) formal regulations influencing entrepreneurship, (b) effectiveness of juridical system in keeping low level of transaction costs and supporting effectiveness of market mechanism, (c) competitive pressure and effectiveness of labor markets, and (d) financial market institutions as a stimulator of development of enterprises with high growth potential. The Human Development Index (HDI) proposed within United Nations Development Programme was used for measuring the quality of life. The estimation of relation between institutions and the human development was made with econometric dynamic panel model. The estimation was made for 24 European Union countries for the years 2004–2010. The econometric analysis shows the positive influence of quality of institutions on the human development in the context of knowledge-based economy in developed countries.

Keywords Institutional economics • Quality of institutions • Human Development Index • TOPSIS • Panel analysis

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1 Introduction

The last decades are considered as a period of fundamental technological and social changes in developed countries. The sociologists often discuss the process of formation of information society (Castells and Himanen 2002). The economists tend to analyze the consequences of the development of knowledge-based economy (Balcerzak 2009a). This process of transformation is the source of great potential that can lead to serious improvement of quality of life. However, its utilization depends on the fulfillment of many factors, which have institutional nature (North 1994; Balcerzak and Rogalska 2010). Thus, the question concerning the characteristics of national institutional systems and their influence on the country's abilities to utilize the potential of the knowledge-based economy is nowadays a hot topic for policymaking in developed economies. In this context the aim of the article is to evaluate the influence of quality of institutional system in the context of the knowledge-based economy on the human development in highly developed countries.

In order to achieve the defined aim of the research in the first part of the article, the authors proposed a measure allowing to operationalize the multivariate concept of quality of institutions in the context of the country's ability to exploit the potential of knowledge-based economy. The definition of quality of institutions is based on the transaction cost theory framework. It is assumed that the institutional system is considered as effective when it contributes to the low level of transaction costs (Williamson 1985). In the second part of the paper, the Human Development Index was used for assessing the level of quality of life. In the last part of the article, the econometric analysis with dynamic panel model for 24 European Union countries for the years 2004–2010 was carried out. The research is a continuation of previous empirical efforts of the authors (Balcerzak and Pietrzak 2014, 2015a, b; Balcerzak 2013, 2015).

2 Quality of Institutions in the Knowledge-Based Economy and the Proposal for Its Measurement

The concept of the knowledge-based economy (KBE) has gained great importance since the early 1990s of the twentieth century in response to the significant changes in structural characteristics of highly developed economies. The distinguishing factor of KBE is an indication on the new main determinants of economic growth in case of developed economies in comparison with the once typical for industrial economy. In contrast to the past decades, where the processes of growth were mostly determined by economies of scale with constant returns and the ability to invest in physical capital, in case of developed countries in the twenty-first century, these factors at best can be considered as a necessary condition for maintaining

growth. The availability of traditional factors of production is not any more a sufficient condition for keeping high growth rate (OECD 1996).

A research carried out in OECD countries has shown that the use of knowledge capital becomes the key development factor in technologically advanced economies (Guloglu and Tekin 2012). The research proved that effective utilization of the knowledge capital largely depends on the quality of regulations and institutional characteristics of economies (OECD 2001; Balcerzak 2009b). High-quality institutions that are up to KBE requirements significantly affect the ability of market players to adapt to rapidly changing conditions. They influence the speed of proliferation of new technologies and the emergence of new ideas in the sphere of organization, production, and creation of products. OECD studies confirmed the growing importance of institutional factors affecting the level of transaction costs that influence entrepreneurship and the competitive pressure in economy, which have an impact on the number of actors able to make effective use of knowledge and to achieve further technological breakthroughs (see Bassanini et al. 2001). Based on empirical studies (OECD 2000, 2001) and the research of institutional economists working on the transaction cost theory (North 1994; Williamson 1985; Eliasson et al. 2004), one can indicate the following segments of national institutional systems, which in the reality of the KBE affect the pace productivity growth. The more advanced argumentation for the selection of these four segments of institutional system as a key element influencing the country's ability to utilize the potential of KBE is presented by Balcerzak and Pietrzak (2014) and Balcerzak (2015):

- (a) The effectiveness of regulations aimed at supporting entrepreneurship—a high level of entrepreneurship positively influences supply of companies with high growth potential (see McKinsey Global Institute 2001).
- (b) The effectiveness of juridical system in keeping low level of transaction costs and supporting effectiveness of market mechanism—the elimination of barriers to structural changes and the diffusion of new technologies or organizational changes are necessary conditions for raising the level of productivity growth (see McKinsey Global Institute 2002a).
- (c) Competitive pressure and effectiveness of labor markets—a high level of competitive pressure is conducive to the phenomenon of Schumpeterian creative destruction and increases the rate of diffusion of the most effective technological solutions (see McKinsey Global Institute 2002b).
- (d) Financial market institutions as a stimulator of development of enterprises with high growth potential—developed and relatively efficient financial markets are conducive to faster reallocation of capital from industries with low growth potential into new sectors with high development potential (OECD 2001; Balcerzak 2009c).

It can be seen that the problem of empirical analysis of the quality of institutional factors in the context of the KBE should be treated as a multidimensional phenomenon. Therefore, in this study the authors used the TOPSIS method that allows synthetic quantification of multidimensional phenomena. In case of the TOPSIS

method, a taxonomic measure of development is described as similarity to the ideal solution. In this method, the measure of development that describes the chosen aspect of the studied phenomenon is obtained by estimating its proximity to the positive ideal solution and its distance from the negative ideal solution. The final value of the synthetic measure is obtained as the arithmetic mean of the indicators obtained for given aspects. The more formal description of the TOPSIS method is presented by Balcerzak and Pietrzak (2014, 2015b).

In this article the research on quality of institutions for KBE was done for 24 European Union countries for the years 2004–2010. As a result of the unavailability of data for Luxembourg, Malta, and Cyprus, these countries were excluded from the research. Croatia was also not included in the research as it joined EU only in 2013. The year 2004 was chosen as the first year of the analysis as it is the year of the biggest European Union enlargement. From the institutional perspective, it can be considered as an example of significant institutional change in Europe. The data from Fraser Institute database created for the Economic Freedom of the World reports was used here. The year 2010 was the last year where the data for all the four mentioned institutional areas was available. A set of potential variables describing four previously identified segments of the institutional system, which are crucial for exploiting the potential of KBE, is presented in Table 1.

Due to the information quality criteria for potential diagnostic variables, which are usually applied in case of multivariate analysis, relating to the minimum level of variation that can be accepted (coefficient of variation in case potential variables should fulfill a given criterion—in this research it was set at the level $V > 0.2$), it was necessary to eliminate the following potential variables: $X_5^1, X_1^2, X_6^2, X_7^2, X_1^3, X_2^3, X_{13}^3, X_{14}^3$, and X_3^4 .

Then the diagnostic variables were normalized with classic standardization formula (see more Balcerzak and Pietrzak 2014). Then a positive ideal solution and negative ideal solution with maximum and minimum values, respectively, for all variables in the years 2004–2010 were pointed. A constant positive and negative ideal solution for the whole period of the study was pointed. This is a condition for obtaining the time series that can be used as an input data in econometric research. Based on the Euclidean metric, a distance from the positive and negative ideal solution for each of the four aspects was estimated, which enabled the calculation of partial taxonomic measures of the development for the given aspects. In the last stage, the value of overall (synthetic) taxonomic measure of development (TMD) for all the four aspects was calculated as the arithmetic average based on the four previously received partial measures. The results for the years 2004 and 2010 are presented in Table 2. The data for all years of analysis for replication purposes is available in Balcerzak and Pietrzak (2014).

Table 1 The potential attributes describing quality of institutional factors influencing utilization of KBE potential used for TOPSIS method

Y_1 —Formal regulations influencing entrepreneurship
X_1^1 —Administrative requirements for entrepreneurs
X_2^1 —Bureaucracy costs for entrepreneurs
X_3^1 —The cost of starting business
X_4^1 —Extra payments/bribes/favoritism
X_5^1 —Licensing restrictions
Y_2 —Effectiveness of juridical system in keeping low level of transaction costs and supporting effectiveness of market mechanism
X_1^2 —Tax compliance
X_2^2 —Judicial independence
X_3^2 —Impartial courts
X_4^2 —Protection of property rights
X_5^2 —Integrity of the legal system
X_6^2 —Legal enforcement of contracts
X_7^2 —Regulatory restrictions on the sale of real property
Y_3 —Competitive pressure and effectiveness of labor markets
X_1^3 —Revenue from trade taxes (% of trade sector)
X_2^3 —Mean tariff rate
X_3^3 —Standard deviation of tariff rates
X_4^3 —Nontariff trade barriers
X_5^3 —Compliance costs of importing and exporting
X_6^3 —Regulatory trade barriers
X_7^3 —Foreign ownership/investment restrictions
X_8^3 —Capital controls
X_9^3 —Controls of the movement of capital and people
X_{10}^3 —Hiring regulations and minimum wage
X_{11}^3 —Hiring and firing regulations
X_{12}^3 —Centralized collective bargaining
X_{13}^3 —Hours regulations
X_{14}^3 —Mandated cost of worker dismissal
Y_4 —Financial market institutions as a stimulator of development of enterprises with high growth potential
X_1^4 —Ownership of banks
X_2^4 —Private sector credit
X_3^4 —Interest rate controls/negative real interest rates

Table 2 The values of taxonomic measure of development for quality of institutions in the KBE context in the years 2004 and 2010

2004		2010	
Country	TMD	Country	TMD
Denmark	0.846	Denmark	0.874037
Finland	0.828	Finland	0.826549
Netherlands	0.755	Sweden	0.798672
Sweden	0.741	Netherlands	0.783481
Ireland	0.740	United Kingdom	0.752381
United Kingdom	0.737	Ireland	0.751787
Austria	0.694	Estonia	0.652863
Belgium	0.625	France	0.644563
France	0.604	Belgium	0.644081
Germany	0.596	Austria	0.633493
Estonia	0.594	Germany	0.614619
Spain	0.543	Spain	0.542529
Slovakia	0.542	Slovenia	0.516917
Lithuania	0.500	Slovakia	0.514530
Czech Republic	0.491	Lithuania	0.506033
Hungary	0.482	Latvia	0.499324
Portugal	0.482	Czech Republic	0.493135
Latvia	0.477	Hungary	0.479794
Slovenia	0.476	Portugal	0.469276
Italy	0.448	Italy	0.452015
Bulgaria	0.396	Bulgaria	0.429206
Greece	0.382	Poland	0.425887
Poland	0.378	Greece	0.383836
Romania	0.353	Romania	0.377285

Source: Own estimation based on data from Fraser Institute

3 Measurement of Quality of Life with Human Development Index

The Human Development Index (HDI) as a measure of socioeconomic development was presented for the first time in 1990 in the work of the United Nations Development Programme (1990). In case of HDI methodology, the social welfare was defined much broader than it was in case of dominant economic dimension focusing exclusively on economic growth. Due to the simplicity of the construction and the availability of the variables used for its index, HDI is currently commonly used as a tool to international benchmarks.

In case of HDI index, three aspects (areas) related to the quality of life are considered. The first aspect concerns the health of citizens and the quality of medical services. It is measured as life expectancy index. The second aspect concentrates on the quality of the educational system. In this case, the evaluation

Table 3 Values of HDI for the years 2004 and 2010

2004		2010	
Country	HDI	Country	HDI
Ireland	0.885	Germany	0.904
Netherlands	0.884	Netherlands	0.904
Denmark	0.883	Ireland	0.899
Sweden	0.883	Denmark	0.898
United Kingdom	0.883	Sweden	0.895
Germany	0.881	United Kingdom	0.895
Belgium	0.862	France	0.879
Finland	0.862	Austria	0.877
France	0.857	Belgium	0.877
Italy	0.852	Finland	0.877
Slovenia	0.851	Slovenia	0.873
Austria	0.845	Italy	0.869
Greece	0.839	Spain	0.864
Spain	0.838	Czech Republic	0.858
Czech Republic	0.834	Greece	0.856
Estonia	0.811	Estonia	0.830
Hungary	0.799	Lithuania	0.829
Lithuania	0.798	Poland	0.826
Poland	0.798	Slovakia	0.826
Slovakia	0.796	Hungary	0.817
Portugal	0.786	Portugal	0.816
Latvia	0.777	Latvia	0.809
Bulgaria	0.744	Romania	0.779
Romania	0.742	Bulgaria	0.773

Source: The data received from Human Development Report Office, United Nations Development Programme based on the methodology presented in United Development Programme (2014a, b)

of this area is done based on two variables: mean years of schooling and expected years of schooling. The last area shows the current economic standard of living and since 2010 is expressed by means of GNI per capita. Recognition of these three areas should allow to reflect quite objectively conditions of life of a given population relying on possible to obtain quantitative data (see Diener and Suh 1997). The HDI index in the years 2004 and 2010 in 24 EU countries is available in Table 3.

4 Econometric Analysis of the Impact of Quality of Institutions in the Context of KBE on HDI

The aim of the article is to evaluate a potential link between the quality of institutions in the context of the knowledge-based economy and quality of life in EU countries. To evaluate the relations between these two factors, a dynamic panel model was used. HDI index was taken as a dependent variable. Taxonomic measure of development (TMD_{it}) of quality of institutions calculated in the second section of the article was taken as an explanatory variable. Based on the commonly accepted assumption due to including delayed dependent variable among explanatory variables, a specification of dynamic panel model was done (see Baltagi 1995). The estimated model is represented by Eq. 1:

$$Y_{i,t} = \alpha_0 + \alpha_1 Y_{i,t-1} + \beta_1 X_{i,t} + \eta_{it} + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ is a vector of dependent variable (HDI), $Y_{i,t-1}$ is a vector of delayed dependent variable, $X_{i,t}$ is a vector of taxonomic measure of development $TMR_{i,t}$ that represents the quality of institutions for KBE, $\alpha_0, \alpha_1, \beta_1$ are the structural parameters of the model, η_{it} is the vector of individual effects of panel model, and $\varepsilon_{i,t}$ is a vector of disturbances.

The parameters of the panel model specified with Eq. 1 were estimated with the system estimator GMM (Blundell and Bond 1998). Two-step estimation procedure with asymptotic standard errors was applied. The estimator is a development of the first-difference GMM estimator (Arellano and Bond 1991). In case of that estimator, the estimation of both equations in first differences and equations in levels is done. The results of the estimation procedure are presented in Table 4.

The next step was the verification of panel model statistical properties. For this purpose, the Sargan test and tests for the serial autocorrelation of differences of residuals were used (Blundell et al. 2000). The statistics of the Sargan test indicates that over-identifying restrictions are justified, which confirms that all instruments applied in the estimations are proper. The statistics of the test for first-order serial correlation indicates negative statistically significant first-order serial correlation, and the statistics for second-order serial correlation indicates that there is no

Table 4 The results of estimation of dynamic panel model

Variable	Parameter	Estimation of the value of parameter	p-Value
$Y_{i,t-1}$	α_1	0.791	≈ 0.000
$X_{i,t}$	β_1	0.043	≈ 0.000
Statistical tests		Test statistics	p-value
Sargan test		20.446	0.34
AR(1)		-2.843	0.004
AR(2)		-1.841	0.064

Source: Own estimation based on Balcerzak and Pietrzak (2015b)

second-order serial correlation (see Baltagi 1995). This indicates that the applied GMM estimator is consistent and efficient.

The parameter α_1 is statistically significant which confirms the assumption of autoregressive mechanism in the case of HDI. The parameter β_1 is also statistically significant, which confirms significant impact of quality of institutions in the context of KBE on the quality of life measured with HDI in 24 EU countries in the years 2004–2010.

5 Conclusions

In the article the authors proposed a method of measuring quality of institutions in the context of the KBE in case of EU countries. The definition of high-quality institutions was based on the transaction cost theory, where the effective institutions result in lower level of transaction costs. The proposed quantitative approach based on the TOPSIS method can be considered as a complementary perspective to qualitative methodology which dominates in institutional economics. The authors proposed a synthetic measure based on the vector of variables grouped to for institutional aspects that are crucial for utilizing the potential of the KBE. The choice of the aspects was based on the empirical research for OECD countries in the contexts of their abilities to utilize the potential of the KBE, which have been done for the last two decades.

The selected four aspects of the institutional system were related to the effectiveness of legal regulations aimed at promoting entrepreneurship, law institutions conducive to maintaining a low level of transaction costs and high efficiency of the market mechanism, and legal regulations supporting the competitive environment and the efficiency of labor markets and financial market institutions. Based on previous empirical studies, it can be noted that these institutional aspects positively affect productivity growth in reality of KBE. This means that the high quality of institutions should support the utilization of macroeconomic potential of rapid technological changes within the KBE. Thus, it should lead to higher quality of life.

As a result of utilization of econometric dynamic panel modeling procedure, it was possible to fulfill the main aim of the article in the form of estimating the relationship between the quality of life and the quality of intuitions for KBE in EU countries in the years 2004–2010. The research confirms that institutional factors associated with the development of the KBE are an important determinant of the quality of life in EU countries, which must be taken into consideration by all governments in EU countries in the process of institutional reforms.

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