

## **ECONOMIC DEVELOPMENT AS AN INTERRELATION BETWEEN WEALTH, COMPETITIVENESS, AND INTELLECTUAL CAPITAL – EMPIRICAL EVIDENCES**

**Mihaela HERCIU<sup>1</sup>**

*Lucian Blaga University of Sibiu*

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### **Abstract**

*The present article is based on the previous article that was published in The Procedia of Economics and Finance. This article proposes an index that measures the economic development by integrating national wealth, national competitiveness and intellectual capital in the same structure. There are used data from 40 developed, emerging and developing countries.*

**Keywords:** *economic development, national competitiveness, national wealth, national intellectual capital, index*

**JEL classification:** *O10, O50*

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### **1. Introduction**

Economic development is in Todaro and Smith (2009) opinion “both a physical reality and a state of mind in which the society has secured the means for obtaining a better life. Whatever the specific components of this better life are, development in all societies must have at least the following three objectives: (1) To increase the availability and widen the distribution of basic life-sustaining goods; (2) To raise the levels of living including higher incomes, the provision of more jobs, a better education, and greater attention to the cultural and human value; (3) To expand the range of economic and social choices”.

Many other specialists considered that economic development is a system of differential equations the solution to which imitates some of the

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<sup>1</sup> *Professor, PhD, Faculty of Economic Sciences, [mihaela.herciu@ulbsibiu.ro](mailto:mihaela.herciu@ulbsibiu.ro)*

main features of the economic behavior that we observe in the world economy (Lucas Jr.,1988), a development that meets the needs of the present without compromising the ability of future generation to meet their own needs (World Commission on Environment and Development), not only national stocks of manufactured, human, and natural capital (Dasgupta, 2002).

In this context, the level of economic development of a country can be influenced by a variety of factors such as: geography, modernization processes, culture, liberalization (Lynn and Vanhanen 2002; Yang, 2011); genuine savings as key indicators to measure change in stocks of critical nature assets (Pearce, Hamilton, and Atkinson, 1996); the state of education and health in the society, taking into consideration the fact that education creates knowledge, skills and capabilities (Bontis, 2001, Malhotra, 2002, Benhabib and Spiegel, 1994); competitiveness as the ability to produce welfare (Aiginger, 2006).

Taking into consideration the following: (1) “Moving to an advanced economy requires that vigorous local rivalry develop... Competition must shift from imitation to innovation and from low investment to high investment in not only physical assets but also intangibles” (Porter, 2000); (2) “The intelligence of the population has been a major factor responsible for the national differences in economic growth and for gap in per capita income between rich and poor nations” (Lynn and Vanhanen, 2002); (3) Economic development is not only about per capita wealth, where wealth includes produced, natural, and human capital (Dasgupta and Maler 2000, Arrow et al. 2003, Lange 2004), it is “about a shift in focus from economic development as GNP growth to economic development as a process of portfolio management that seeks to optimize the management of each asset and the distribution of wealth among different kinds of assets” (Lange 2004), we choose national wealth, national competitiveness and national intellectual capital as sources for economic development.

This paper proposes an index that measures the economic development (EDI) by integrating the national wealth, the national competitiveness and the national intellectual capital.

## 2. Data, methodology and results

### *Construction of the economic development index (EDI)*

In this study we propose an index for measuring the economic development (EDI) as a weighted sum of the three scores obtained by national wealth (GDP per capita), national competitiveness (growth competitiveness index), and national intellectual capital (national intellectual capital).

**Table 1: GDP per capita, GCI and NICI for 40 countries**

Country	GDP per capita (US dollars)	GCI	NICI	Country	GDP per capita (US dollars)	GCI	NICI
Argentina	9138	3.99	13.34	Korea	20591	5.02	20.04
Australia	55590	5.11	24.69	Malaysia	8423	5.08	19.15
Austria	44987	5.14	24.26	Mexico	9566	4.29	14.13
Belgium	42630	5.2	23.32	Netherlands	47172	5.41	23.84
Brazil	10816	4.32	13.98	New Zealand	32145	4.93	20.83
Canada	46215	5.33	25.56	Norway	84444	5.18	25.45
Chile	11828	4.7	18.27	Philippines	2007	4.08	14.5
China	4382	4.9	15.06	Poland	12300	4.46	14.83
Czech Republic	18288	4.52	17.98	Portugal	21559	4.4	18.06
Denmark	56147	5.4	28	Russia	10437	4.21	15.09
Finland	44489	5.47	29.47	Singapore	43117	5.63	26.8
France	41019	5.14	21.64	South Africa	7158	4.34	15.41
Germany	40631	5.41	23.86	Spain	30639	4.54	19.03
Greece	27302	3.92	16.53	Sweden	48875	5.61	29.25
Hungary	12879	4.36	19.06	Switzerland	67246	5.74	28.46
Iceland	39026	4.75	26.13	Taiwan	18458	5.26	23.17
India	1265	4.3	13.7	Thailand	4992	4.52	16.02
Ireland	45689	4.77	24.08	Turkey	10399	4.28	14.43
Italy	34059	4.43	18.36	United Kingdom	36120	5.39	22.5
Japan	42820	5.4	24.13	United States	47284	5.43	27.64
	GDP per capita	GCI	NICI				
Mean	29803.3	4.859	20.75125				
STDEV	20059.36748	0.51612	5.016684				

**Source:** World Economic Forum and Lin Yeh-Yun and Edvinsson (2010)

In order to transform the collected datas in comparative one we use a quantitative scale from 1 to 10, by using the formula:

$$x_{ij} = \frac{y_{ij} \times 10}{y_{i_{\max}}} \quad (1)$$

where,

$x_{ij}$  – score for each variable  $i$  ( $i$  – national wealth, national competitiveness and national intellectual capital) for country  $j$  (W, C, IC)

$y_{ij}$  – the value from Table 1 of each variable  $i$  for country  $j$

$y_{i_{\max}}$  – the maximum level of variable  $i$

W, C, and IC represent the adjusted value of GDP per capita, GCI and NICI calculated by using formula (1) and are shown in the Table 2.

**Table 2: Adjusted value for GDP per capita, GCI and NICI (W, C, and IC)**

Country	W	C	IC	Country	W	C	IC
Argentina	1.08	6.95	4.53	Korea	2.44	8.75	6.80
Australia	6.58	8.90	8.38	Malaysia	1.00	8.85	6.50
Austria	5.33	8.95	8.23	Mexico	1.13	7.47	4.79
Belgium	5.05	9.06	7.91	Netherlands	5.59	9.43	8.09
Brazil	1.28	7.53	4.74	New Zealand	3.81	8.59	7.07
Canada	5.47	9.29	8.67	Norway	10.00	9.02	8.64
Chile	1.40	8.19	6.20	Philippines	0.24	7.11	4.92
China	0.52	8.54	5.11	Poland	1.46	7.77	5.03
Czech Republic	2.17	7.87	6.10	Portugal	2.55	7.67	6.13
Denmark	6.65	9.41	9.50	Russia	1.24	7.33	5.12
Finland	5.27	9.53	10.00	Singapore	5.11	9.81	9.09
France	4.86	8.95	7.34	South Africa	0.85	7.56	5.23
Germany	4.81	9.43	8.10	Spain	3.63	7.91	6.46
Greece	3.23	6.83	5.61	Sweden	5.79	9.77	9.93
Hungary	1.53	7.60	6.47	Switzerland	7.96	10.00	9.66
Iceland	4.62	8.28	8.87	Taiwan	2.19	9.16	7.86
India	0.15	7.49	4.65	Thailand	0.59	7.87	5.44
Ireland	5.41	8.31	8.17	Turkey	1.23	7.46	4.90
Italy	4.03	7.72	6.23	United Kingdom	4.28	9.39	7.63
Japan	5.07	9.41	8.19	United States	5.60	9.46	9.38

Source: own calculations

Modeling and calculating EDI will be made by using as instrument the discriminative analyzing technique – a function of multiple regression which has as main characteristic to allow the explanation of an exogenous phenomena (which is, generally, qualitative) with the help of some (quantitative) endogenous variables.

The model we propose is based on a multiple linear regression as follows:

$$EDI = a_1W + a_2C + a_3IC + \sum_{i=1}^3 b_i \quad (2)$$

where,

$a_1, a_2, a_3, b_i$  – represent parameters

W (adjusted value of GDP per capita)

C (adjusted value of Growth Competitiveness Index)

IC (adjusted value for National intellectual Capital)

After the calculus, we will get for the a and b parameters the results presented in Table 3:

**Table 3: The a and b parameters**

Variable	$x_{\text{minim}}$	$x_{\text{maxim}}$	a	b
W	0.15	10	0.1015	- 0.0162
C	6.83	10	0.3154	- 2.1556
IC	4.53	10	0.1828	- 0.8282

In conclusion, the model that we propose in order to calculate EDI is defined by the following equation:

$$EDI = 0.1015W + 0.3154C + 0,1828IC - 3 \quad (3)$$

The maximum value of EDI can be 3, and the minimum value can be 0. Results of EDI according to the equation (3), in a descendent order, are:

**Table 4: The level of EDI for all 40 countries**

Country	EDI	Country	EDI	Country	EDI	Country	EDI
Switzerland	2.73	Japan	1.98	New Zealand	1.39	Italy	0.98
Sweden	2.48	Germany	1.94	Korea	1.25	Chile	0.86
						South Africa	0.43
						Russia	0.37

Norway	2.44	Austria	1.87	Malaysia	1.08	Czech Republic	0.82	Turkey	0.37
Denmark	2.38	Belgium	1.82	Spain	1.04	Portugal	0.80	Brazil	0.37
Finland	2.37	United Kingdom	1.79			Hungary	0.73	Mexico	0.35
Singapore	2.27	Iceland	1.70			China	0.68	India	0.23
United States	2.27	Ireland	1.66			Thailand	0.54	Philippines	0.17
Canada	2.07	France	1.66			Poland	0.52	Argentina	0.13
Netherlands	2.02	Taiwan	1.55			Greece	0.51		
Australia	2.01								

The countries are arranged in 5 groups, in an descendent order after EDI, such as: 1<sup>st</sup> group – the group of the countries with a very high level of EDI, have 10 countries with EDI score higher than 2.0; 2<sup>nd</sup> group – the group of the countries with high level of EDI - have 9 countries with EDI between 1.5 and 1.99; 3<sup>rd</sup> group – the group of the countries with medium EDI – have only 4 countries with EDI between 1.0 and 1.49; 4<sup>th</sup> group – the group of the countries with lower middle EDI – have 9 countries with EDI higher than 0.5 but lower than 1; 5<sup>th</sup> group – the group of the countries with lower EDI - have 8 countries with EDI lower than 0.5.

### 3. Conclusions

National wealth, national competitiveness and national intellectual capital represent some of the most important objectives of a nation. Many studies have demonstrated that these objectives are in interrelations and capable to create great synergies for countries. The results obtained for Pearson and  $R^2$  demonstrate that between the national wealth, national competitiveness and national intellectual capital are a strong and direct correlation with significance of the model of 0.001.

The model we proposed for calculating the economic development as a synergy between national wealth, national competitiveness and national intellectual capital, gave us the opportunity to identify clusters of countries. The Nordic European Countries, United States, Canada, Australia and Switzerland are countries with very high level of economic development based on the high GDP per capita, high competitiveness and national intellectual capital. The other developed European Countries (Germany, Austria, France, United Kingdom, Iceland, Ireland, and France), and Japan are countries with high competitiveness, high level of GDP per capita but with a

medium level of national intellectual capital. Taiwan is in the second group because of its high level of competitiveness, not because of the level of GDP per capita that is lower middle. The emerging countries like Chile, Czech Republic, Poland, China, Thailand, and Hungary have lower middle level of GDP per capita, national competitiveness and national intellectual capital. Three of the BRIC countries (Russia, Brazil, and India) and two Latin American countries (Mexico and Argentina) have obtained a very low level of economic development index because their lower level for all three variables.

In conclusion, for achieving and maintaining economic development a country must improve/increase in the same time the level of GDP per capita, the level of national competitiveness and the level of national intellectual capital.

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