

## GLOBAL COMPETITIVENESS INDEX REPRESENTATION OF ENTERPRISE PERFORMANCES

*Adi Eleonor TRIFU<sup>1</sup>*  
*Mircea Răducu TRIFU<sup>2</sup>*

---

### ABSTRACT

*The objective of this paper is show that exists a relation between the national competitiveness of countries and the on the business performances. This study uses the World Competitiveness Index, developed by the World Economic Forum, and the Turnover per Enterprise is calculated with data from Eurostat Database. The method used is Ordinary Least Squares regression with 28 cross-section representing the 28 member states of the European Union and the time period between 2008 and 2011. The base is addressed to managers, entrepreneurs, specialists, researchers and all interested persons.*

**KEYWORDS:** *Competitiveness, business, Index, regression.*

**JEL CLASSIFICATION:** *M10, M20, O10, O52*

---

### 1. INTRODUCTION

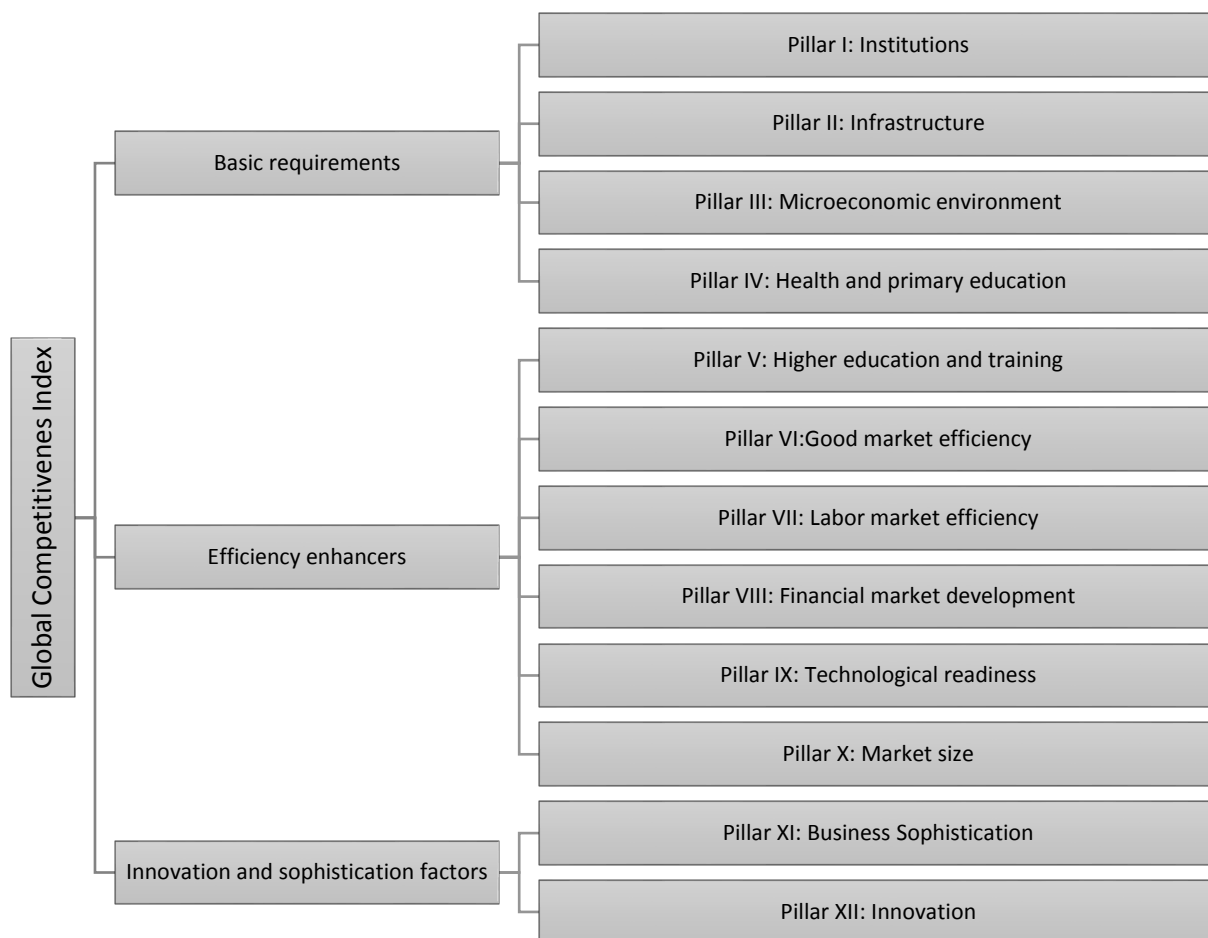
In present companies across the world try to improve their global, regional know-how in order to expand into new markets. Main difficulty represented by the variables that describe the market traits and its competitiveness. Also countries try to improve their competitiveness in order to attract important companies to invest in local assets, improve local infrastructure and employ the local population. Even certain institutions like the World Bank, International Monetary Fund and United Nation try to classify the development of countries after GDP per capita, Ease of Doing Business (World Bank 2013), Human Development Index (United Nation) or other variables, no certain index can satisfy the need of investors to describe an economy after its economic performances. In response, the World Economic Forum tried in 2004, to rank countries across the world by using the Global Competitiveness Index, developed by Sala-i-Martin and Artadi (2004). Before Global Competitiveness Index, World Economic Forum were used the Growth Competitiveness Index, developed by Sachs and McArthur (2002) and Business Competitiveness Index developed by Porter (1990).

The 2015-2016 Edition of Sala-I-Martin's GCI is structured on twelve pillars which combines 114 indicators that try to show the variables that influence the productivity. The 12 pillars are: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, good market efficiency, labour market efficiency, technological readiness, market size, business sophistication and innovation. The pillars form three subindexes: basic requirements, efficiency enhancers, and innovation and sophistication factors, which represent three main stages of development of the country: factor driven economy, efficiency-driven economy and innovation-driven economy.

---

<sup>1</sup> Bucharest University of Economic Studies, Romania, trifu\_adi\_eleonor@yahoo.com

<sup>2</sup> Bucharest University of Economic Studies, Romania



**Figure 1. Structure of the Global Competitiveness Report**

*Source:* Global Competitiveness Report (2016)

Subindexes have different weights in the calculation of the overall Index, by the GDP per capita and shares of exports represented by raw materials. The subindexes weights chosen depending on stages of development of an economy. The complete composition of the World Competitiveness Index can be seen in the Appendix 1. A country that has factor-driven economy compete mostly on the primary unskilled labor force and natural resources, been influenced by the first four pillars (Institutions, Infrastructure, Macroeconomic Environment and Health and primary education). While countries with efficiency-driven economy is based on the more complex production processes and the increase of product quality. These types of economies have higher weight on the pillars 5 to 10 (Higher Education and Training, Good market efficiency, Labor market efficiency, Financial market development, Technological readiness, and Market size). The innovation-driven economy compete on high complexity business and research & development activities. These economies have a high weight on Pillar 11 and Pillar 12. The value of the weights can be seen on the table below:

**Table 1. Subindex weights and income thresholds for stage of development**

	Stage of development				
	Stage 1: Factor-driven	Transition from stage 1 to stage 2	Stage 2: Efficiency- driven	Transition from stage 2 to stage 3	Stage 3: Innovation- driven
GDP per capita (USD) thresholds	<2000	2000-2.999	3000-8999	9009-17000	>17000
Weight for basic requirements	60%	40-60%	40%	20-40%	20%
Weight for efficiency enhancers	35%	35-50%	50%	50%	50%
Weight for innovation and sophistication factors	5%	5-10%	10%	10-30%	30%

*Source:* World Competitiveness Report 2015-2016 (p.35)

## 2. METHODOLOGY

The empirical methodology used is Ordinary Least Square method where the logarithmic growth of the turnover per enterprise represents the dependent variable and the Global Competitiveness Index represents the independent variable. The variables have the form of a data panel, which composed of 28 cross-section representing 28 member states of the European Union and a time series set between 2008 and 2014. Data for Turnover/enterprise was collected from Eurostat Database: Structural Business statistics, while data for the World Competitiveness Index and its subindex was taken from the World Economic Forum website. Second regression is represented by the relation of subindex on the logarithmic growth.

According to the World Competitiveness Report 2015-2016, Romania rank 53 out of 140 surveyed countries in 2015-2016 GCI, while for the Factor-driven Index took the place 70, Efficiency-driven Index took the place 44 and Innovation-driven Index took the place 84. Also expect Bulgaria which is an Efficiency-driven economy, all members of European Union are in the Innovation-Driven economies (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom) or in the transition between Efficiency-driven and Innovation-Driven economy (Croatia, Hungary, Latvia, Lithuania, Poland, Romania).

The selected dependent variable is the Turnover per enterprise (millions euro/enterprise) because it shows the average performance of enterprises for each country. The Turnover/enterprise is calculated with data from Eurostat by dividing Turnover or gross premiums written and the number of enterprises. After that result is put under logarithm in order to use growth.

The formula for the Ordinary Least Square function is taken from Mittelhammer, R. C. (1996) book *Mathematical Statistics for Economics and Business*:

$$Y_i = A + B \times X_i + \varepsilon_i$$

Legend:

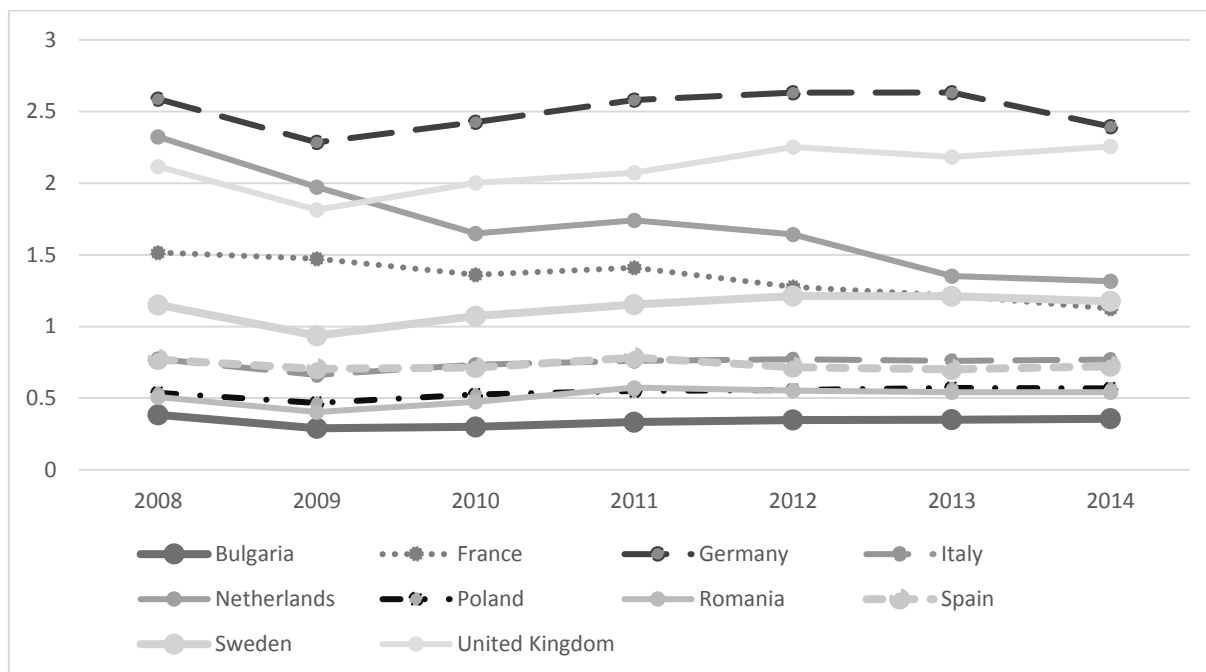
$Y_i$  – dependent variable

$X_i$  – exogenous variables

$\varepsilon_i$  -residuals

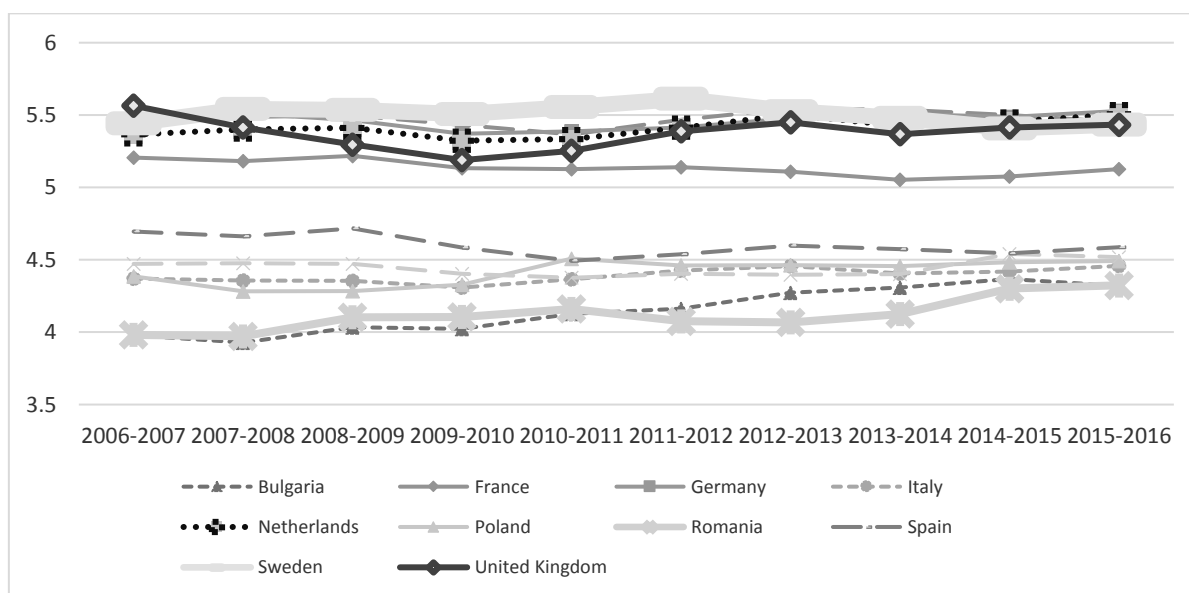
a - constant

B - Intercept or coefficient of the  $X_i$  variables



**Figure 2. Turnover/enterprise**  
 Source: Made by authors with data from Eurostat data

The countries that have the highest turnover per enterprises in the European Union is Luxembourg with approximately 5 million euro per enterprise, followed by Ireland with 2.6 million euro per enterprise and the United Kingdom with 2.3 million per enterprise. The lowest rank by turnover per enterprise is taken by Greece with 0.35 million per enterprise, followed by Bulgaria with 0.35 million per enterprise, Portugal 0.39 million euro per enterprise and the Czech Republic with 0.42 million per enterprise Romania has the value turnover per enterprise of approximately 0.5 million euro.



**Figure 3. Global Competitiveness Index**  
 Source: Made by authors with data from the World Economic Forum

In 2014, EU countries that have a high Global Competitiveness index been Germany (5.49), Greece (5.48), Netherlands (5.45), United Kingdom (5.41), Sweden (5.40), Denmark (5.28), Belgium (5.17), Austria (5.15), France (5.07), Luxembourg (5.01). At the bottom of the rank are Bulgaria (4.36), Romania (4.30). Slovakia (4.30), Slovenia (4.21). The evolution of Romania Global Competitiveness Index and its subindex by value and rank is showed in the table below.

**Table 2. Evolution Romania's Global Competitiveness Index and Rank**

Romania	Global Competitiveness		Basic requirements		Efficiency enhancers		Innovation and sophistication factors	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank
<b>2006-2007</b>	3.98142	73	4.078209	83	3.9976619	57	3.5130544	66
<b>2007-2008</b>	3.9717657	74	4.0686762	88	3.9802604	62	3.5416502	73
<b>2008-2009</b>	4.1029154	68	4.1470392	87	4.1812155	54	3.5349198	75
<b>2009-2010</b>	4.105217	64	4.1004847	86	4.2508899	49	3.443678	75
<b>2010-2011</b>	4.1608705	67	4.3617934	77	4.183333	54	3.2448669	91
<b>2011-2012</b>	4.0756827	77	4.2765077	89	4.0904846	62	3.1983737	99
<b>2012-2013</b>	4.0685379	78	4.2224008	90	4.1198857	64	3.1963475	106
<b>2013-2014</b>	4.1253585	76	4.3195879	87	4.1318384	63	3.316041	103
<b>2014-2015</b>	4.3016091	59	4.4778244	77	4.3156885	50	3.5263512	78
<b>2015-2016</b>	4.3239356	53	4.5509121	70	4.3675977	44	3.4758127	84

Source: Global Competitiveness Report 2015-2016, World Economic Forum

### 3. RESULTS

For the Data Panel Ordinary Least Square was used logarithm of the Turnover/Enterprise in order to observe the impact of Index upon the growth of the turnover per enterprise not the nominal values. The equation of the Ordinary Least Square method for the influence of the Global Competitiveness Index on the growth of the Turnover/Enterprise is:

$$\log(\text{Turnover}/\text{Enterprise}) = C(1) + C(2) \times GCI$$

**Table 3: Panel Data Ordinary Least Square for the Log(Turnover/Enterprise)**

Dependent Variable: LOG(TURNOVER/ENTERPRISES)				
Method: Panel Least Squares				
Sample: 2008 2014				
Periods included: 7				
Cross-sections included: 28				
Total panel (balanced) observations: 196				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GCI	0.924047	0.079526	11.61937	0
C	-4.50885	0.378413	-11.9151	0
R-squared	0.410352	Mean dependent var		-0.13608
Adjusted R-squared	0.407313	S.D. dependent var		0.720409
S.E. of regression	0.554616	Akaike info criterion		1.669069
Sum squared residuals	59.67411	Schwarz criterion		1.702519
Log likelihood	-161.569	Hannan-Quinn criter.		1.682611
F-statistic	135.0099	Durbin-Watson stat		0.075925
Prob(F-statistic)	0			

Source: made by authors

According to R-square the independent variable (GCI) explains the evolution of the dependent variable with 41.04%. Adjusted R-squared value of 40.73% show that the data are average fitted to the model. Durbin-Watson Stat value of 0.0759, which is less than 2, means that the errors are not correlated. The constant is statistic significant for a confidence level of 99%, because the probability value (p-value) is less than 0.01. The Global Competitiveness Index is also a variable that statistic significant for the confidence level of 99% and it influence is 0.92 which is meaning that if the GCI would grow with one point the Log(Turnover/enterprise) with 0.92 percent points.

The regression model equation:

$$\text{LOG(TURNOVER/ENTERPRISES)} = 0.9240 * \text{CGI} - 4.50885048402$$

The equation of the Ordinary Least Square method for the influence of three subindexes that compose the Global Competitiveness Index on the growth of the Turnover/Enterprise is:

$$\log(\text{Turnover/Enterprise}) = C(1) + C(2) \times \text{ISI} + C(3) \times \text{EEI} + C(4) \times \text{BRI}$$

**Table 4. Panel Data Ordinary Least Square for the Log(Turnover/Enterprise) for the three subindexes**

Dependent Variable: LOG(TURNOVER/ENTERPRISES)				
Method: Panel Least Squares				
Sample: 2008 2014				
Periods included: 7				
Cross-sections included: 28				
Total panel (balanced) observations: 196				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ISI	0.399271	0.138004	2.893177	0.0043
EEI	0.360755	0.201562	1.789795	0.0751
BRI	0.316785	0.128995	2.455801	0.0149
C	-5.18506	0.563983	-9.19363	0
R-squared	0.702069	Mean dependent var		-0.13608
Adjusted R-squared	0.697414	S.D. dependent var		0.720409
S.E. of regression	0.396281	Akaike info criterion		1.006813
Sum squared residuals	30.15148	Schwarz criterion		1.073713
Log likelihood	-94.6677	Hannan-Quinn criter.		1.033897
F-statistic	150.815	Durbin-Watson stat		0.163144
Prob(F-statistic)	0			

Source: made by authors

According to R-square the independent variables (Turnover/enterprise) explain the evolution of the dependent variable with 70.21%. Adjusted R-squared value of 69.74% show that the data are average fitted to the model. Durbin-Watson Stat value of 0.1631, which is less than 2, means that the errors are not correlated. The constant is statistic significant for a confidence level of 99%, because the probability value (p-value) is less than 0.01. The Innovation and Sophistication Index variable is statistic significant for the confidence level of 99% and its coefficient has the value of 0.3992 which means that if the ISI would increase with one unit the Log(Turnover/enterprise) with 0.3992 percent points. The Efficiency Enhancer Index variable is statistic significant, but for the confidence level of 90% and its coefficient has the value of 0.3607 which means that if the EEI would increase with one unit the Log(Turnover/enterprise) with 0.36 percent points. The Basic Requirements Index variable is statistic significant, but for the confidence level of 95% and its coefficient has the value of 0.3167 which means that if the BRI would increase with one unit the

Log(Turnover/enterprise) with 0.3167 percent points. Resulting that in the European Union's member states the Innovation and Sophistication is the most important variable

The regression model equation:

$$\text{LOG}(\text{TURNOVER}/\text{ENTERPRISES}) = 0.3992 * \text{ISI} + 0.3607 * \text{EEI} + 0.31678 * \text{BRI} - 5.1850$$

#### 4. CONCLUSION

In conclusion, the Global Competitiveness Index, developed by World Economic Forum, describe very well the performances of enterprise, mainly the turnover/enterprise. The study reveals that in the European Union the most important subindex is represented by the Innovation and Sophistication of Business Index, because most of the member states have Innovation-driven economies or are the Transition area from Efficiency-driven economy. Also the other two subindexes have a strong impact on the growth of the performance of the enterprises, but not at the same level of confidence as Innovation and Sophistication of Business. The main limit of this study is represented by the limited number of economies that were used and similar type of economies. It should consider that in order to prove that the index, developed by WEF can determine the relation of a country competitiveness and the performance of the enterprise, the study must be extended to more types of economies and other types of indicators.

#### REFERENCES

- Porter, M. E., Sachs, J., Cornelius, P. K., McArthur, J. W. & Schwab, K. (2002). *The global competitiveness report 2001-2002*. (pp. 16-25). New York, NY: Oxford University Press.
- Porter, M. E., Delgado, M., Ketels, C. & Stern, S. (2008). *Moving to a new global competitiveness index. The global competitiveness report*. 2009, 43-63.
- Sala, M., Xavier & Elsa, V. A. (2004). *The Global Competitiveness Index*. Global Competitiveness Report, Global Economic Forum.
- Mittelhammer, R. C. (1996). *Mathematical Statistics for Economics and Business* Springer Eurostat Database, [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs\\_na\\_sca\\_r2&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_na_sca_r2&lang=en) accessed on 25/09/2016.
- World Economic Forum, <http://reports.weforum.org/global-competitiveness-report-2015-2016/>.
- Ease of Doing Bussiness, <http://www.doingbusiness.org/methodolog>.

#### Appendix: Composition of the Global Competitiveness Index for Romania case in 2016

	Romania
1.01 Property rights, 1-7 (best)	3.887201276
1.02 Intellectual property protection, 1-7 (best)	3.884973504
1. Property rights	3.886458685
1.03 Diversion of public funds, 1-7 (best)	2.9172163
1.04 Public trust in politicians, 1-7 (best)	2.172158184
1.05 Irregular payments and bribes, 1-7 (best)	3.627398333
2. Ethics and corruption	2.905590939
1.06 Judicial independence, 1-7 (best)	3.956684836
1.07 Favoritism in decisions of government officials, 1-7 (best)	2.43189253
3. Undue influence	3.194288683
1.08 Wastefulness of government spending, 1-7 (best)	2.475020028
1.09 Burden of government regulation, 1-7 (best)	3.121227265
1.10 Efficiency of legal framework in settling disputes, 1-7 (best)	3.31128463
1.11 Efficiency of legal framework in challenging regs., 1-7 (best)	3.292563788
1.12 Transparency of government policymaking, 1-7 (best)	3.880383596
4. Government efficiency	3.216095861
1.13 Business costs of terrorism, 1-7 (best)	5.229873724



	Romania
1.14 Business costs of crime and violence, 1-7 (best)	4.946980971
1.15 Organized crime, 1-7 (best)	4.63412173
1.16 Reliability of police services, 1-7 (best)	4.216674186
5. Security	4.756912653
A. Public institutions	3.591869364
1.17 Ethical behavior of firms, 1-7 (best)	3.448601185
1. Corporate ethics	3.448601185
1.18 Strength of auditing and reporting standards, 1-7 (best)	4.315639047
1.19 Efficacy of corporate boards, 1-7 (best)	4.316924072
1.20 Protection of minority shareholders' interests, 1-7 (best)	3.720702184
1.21 Strength of investor protection, 0-10 (best)*	6.2
2. Accountability	4.268316326
B. Private institutions	3.858458756
1st pillar: Institutions	3.658516712
2.01 Quality of overall infrastructure, 1-7 (best)	3.613692463
2.02 Quality of roads, 1-7 (best)	2.752693804
2.03 Quality of railroad infrastructure, 1-7 (best)	2.754697041
2.04 Quality of port infrastructure, 1-7 (best)	3.419629832
2.05 Quality of air transport infrastructure, 1-7 (best)	3.556912405
2.06 Available airline seat km/week, millions*	219.6428177
A. Transport infrastructure	2.957194642
2.07 Quality of electricity supply, 1-7 (best)	4.517190753
2.09 Fixed telephone lines/100 pop.*	21.25676658
2.08 Mobile telephone subscriptions/100 pop.*	105.91415
B. Electricity and telephony infrastructure	4.267053442
2nd pillar: Infrastructure	3.612124042
3.01 Government budget balance, % GDP*	-1.866
3.02 Gross national savings, % GDP*	22.547
3.03 Inflation, annual % change*	1.076
3.04 General government debt, % GDP*	40.379
3.05 Country credit rating, 0-100 (best)*	noshow
3rd pillar: Macroeconomic environment	5.441077865
4.02 Business impact of malaria, 1-7 (best)	N/Appl.
4.01 Malaria cases/100,000 pop.*	M.F.
4.04 Business impact of tuberculosis, 1-7 (best)	5.054320066
4.03 Tuberculosis cases/100,000 pop.*	87
4.06 Business impact of HIV/AIDS, 1-7 (best)	4.941007424
4.05 HIV prevalence, % adult pop.*	0.1
4.07 Infant mortality, deaths/1,000 live births*	10.5
4.08 Life expectancy, years*	74.46341463
A. Health	6.538178337
4.09 Quality of primary education, 1-7 (best)	4.117622676
4.10 Primary education enrollment, net %*	85.75557
B. Primary education	4.445681338
4th pillar: Health and primary education	5.491929838
Basic requirements	4.550912114
5.01 Secondary education enrollment, gross %*	95.0113
5.02 Tertiary education enrollment, gross %*	51.59729
A. Quantity of education	5.62728589
5.03 Quality of the education system, 1-7 (best)	3.322984514
5.04 Quality of math and science education, 1-7 (best)	4.829420968
5.05 Quality of management schools, 1-7 (best)	3.856391111
5.06 Internet access in schools, 1-7 (best)	4.779052867
B. Quality of education	4.196962365
5.07 Availability of research and training services, 1-7 (best)	3.885390105
5.08 Extent of staff training, 1-7 (best)	3.7523851



	Romania
C. On-the-job training	3.818887603
5th pillar: Higher education and training	4.547711953
6.01 Intensity of local competition, 1-7 (best)	4.514890285
6.02 Extent of market dominance, 1-7 (best)	3.641940701
6.03 Effectiveness of anti-monopoly policy, 1-7 (best)	3.661087739
6.04 Effect of taxation on incentives to invest, 1-7 (best)	2.860219568
6.06 No. procedures to start a business*	5
6.07 No. days to start a business*	8
6.08 Agricultural policy costs, 1-7 (best)	3.986069969
6.05 Total tax rate, % profits*	43.2
1. Domestic competition	4.379022233
6.09 Prevalence of trade barriers, 1-7 (best)	4.495978303
6.11 Prevalence of foreign ownership, 1-7 (best)	4.268189062
6.12 Business impact of rules on FDI, 1-7 (best)	4.657015612
6.13 Burden of customs procedures, 1-7 (best)	4.032064312
6.14 Imports as a percentage of GDP*	44.88132572
6.10 Trade tariffs, % duty*	1.151456349
2. Foreign competition	4.79630846
A. Competition	4.477715832
6.15 Degree of customer orientation, 1-7 (best)	4.776845431
6.16 Buyer sophistication, 1-7 (best)	2.983752248
B. Quality of demand conditions	3.880298839
6th pillar: Goods market efficiency	4.278576835
7.01 Cooperation in labor-employer relations, 1-7 (best)	4.13722276
7.03 Hiring and firing practices, 1-7 (best)	3.716070553
7.02 Flexibility of wage determination, 1-7 (best)	5.138345886
7.05 Effect of taxation on incentives to work, 1-7 (best)	3.070788602
7.04 Redundancy costs, weeks of salary*	4
A. Flexibility	4.61248556
7.06 Pay and productivity, 1-7 (best)	4.053608541
7.07 Reliance on professional management, 1-7 (best)	3.766389747
7.08 Country capacity to retain talent, 1-7 (best)	2.292904426
7.09 Country capacity to attract talent, 1-7 (best)	2.567363786
7.10 Women in labor force, ratio to men*	0.783746594
B. Efficient use of talent	3.649113328
7th pillar: Labor market efficiency	4.130799444
8.02 Affordability of financial services, 1-7 (best)	4.155194438
8.01 Availability of financial services, 1-7 (best)	4.08108452
8.03 Financing through local equity market, 1-7 (best)	3.031603729
8.04 Ease of access to loans, 1-7 (best)	2.931958726
8.05 Venture capital availability, 1-7 (best)	2.372989712
A. Efficiency	3.314566225
8.06 Soundness of banks, 1-7 (best)	4.615625979
8.07 Regulation of securities exchanges, 1-7 (best)	3.722470167
8.08 Legal rights index, 0-10 (best)*	10
B. Trustworthiness and confidence	4.779365382
8th pillar: Financial market development	4.046965803
9.01 Availability of latest technologies, 1-7 (best)	4.648728276
9.02 Firm-level technology absorption, 1-7 (best)	4.438736406
9.03 FDI and technology transfer, 1-7 (best)	4.747205023
A. Technological adoption	4.611556568
9.04 Individuals using Internet, %*	54.08
9.05 Fixed broadband Internet subscriptions/100 pop.*	18.52111314
9.06 Int'l Internet bandwidth, kb/s per user*	153.8066787
9.07 Mobile broadband subscriptions/100 pop.*	49.41274023
B. ICT use	4.653877011

	Romania
9th pillar: Technological readiness	4.63271679
10.03 GDP (PPP\$ billions)*	392.773
10.04 Exports as a percentage of GDP*	44.75402758
10.01 Domestic market size index, 1–7 (best)*	4.359594171
A. Domestic market size	4.359594171
10.02 Foreign market size index, 1–7 (best)*	5.196477973
B. Foreign market size	5.196477973
10th pillar: Market size	4.568815121
Efficiency enhancers	4.367597658
11.01 Local supplier quantity, 1-7 (best)	4.085554628
11.02 Local supplier quality, 1-7 (best)	4.157588297
11.03 State of cluster development, 1-7 (best)	3.648478274
11.04 Nature of competitive advantage, 1-7 (best)	3.126913806
11.07 Production process sophistication, 1-7 (best)	3.65490083
11.09 Willingness to delegate authority, 1-7 (best)	3.613553774
11.06 Control of international distribution, 1-7 (best)	3.558187564
11.08 Extent of marketing, 1-7 (best)	3.988598272
11.05 Value chain breadth, 1-7 (best)	3.546193243
11th pillar: Business sophistication	3.711911954
12.01 Capacity for innovation, 1-7 (best)	3.988646752
12.02 Quality of scientific research institutions, 1-7 (best)	3.719732432
12.03 Company spending on R&D, 1-7 (best)	2.947221006
12.04 University-industry collaboration in R&D, 1-7 (best)	3.589554287
12.05 Gov't procurement of advanced tech products, 1-7 (best)	2.895348472
12.06 Availability of scientists and engineers, 1-7 (best)	4.133627039
12.07 PCT patents, applications/million pop.*	2.707808845
12th pillar: Innovation	3.239713467
Innovation and sophistication factors	3.475812711
Global Competitiveness Index	4.323935618

*Source:* Global Competitive Index Dataset 2015-2015, World Economic Forum