

Corruption Perception Index (CPI) in European countries: Monitoring with GIS

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Abstract

This paper examines the relationship between corruption and economic growth in European countries, taking into account that corruption is considered as a political, economic, cultural and moral problem. Specifically, this paper will focus on countries of the Eurozone, the European Union, the European Economic Area and the Central and Eastern European countries, including Turkey and Kazakhstan, over the period from 2005 to 2021. Our ultimate goal is to understand how corruption affects economic development by tracking the GDP per capita and the values of measured corruption and also how changes in GDP growth rates are affected by corruption changes. In addition to graphs, the survey provides numerical results displayed in charts using Geographical Information System (GIS). Our survey shows that all European countries with high GDP per capita tend to have low corruption values, with the exception of the countries in Central and Eastern Europe, including Turkey and Kazakhstan. The survey also shows that higher GDP per capita growth rates are correlated linearly with the reduction of the corruption levels in all categories of almost all European countries, with the exception the Central and Eastern European countries, including Turkey and Kazakhstan.

Keywords

Corruption, GDP Per Capita, Economic Growth, European Countries, GIS, Per Capita GDP Growth Rate

1. Introduction—Measuring Corruption

Corruption is measured using questionnaires designed by certain companies. As these questionnaires focus on the experiences of individuals or groups, they contain subjective data. The results of these surveys are published in the form of specific or composite indicators (Mocan, 2008). Some of these indicators are:

- Every year since 1995, *Transparency International* organization measured the public's *Corruption Perceptions Index* (CPI) as a composite index in each country. This index combines annual data on perceived corruption in the public sector for specific organisations and individuals.
- The *World Bank* uses a six-monthly survey called the *Control of Corruption Index* (CCI), which includes data from organisations and individuals outside the World Bank. This index is a composite index that focuses on public corruption.
- Starting from the time period 1981-1983, the *Economist Intelligence Unit* collects data from around the world on levels of corruption in order to calculate the *Business International* (BI) index ([Economist Intelligence Unit, 2016](#)).
- *Transparency International* non-governmental organization publishes the annual *Global Corruption Barometer* (GCB). The survey examines people's views on corruption and has been conducted by the organization since 2003.
- *Transparency International* organization measures the ability of companies to bribe public officials and institutions in countries with less developed economies. The resulting *Bribe Payers Index* (BPI) is based on surveys of senior business and banking executives conducted by the international non-governmental organisation.
- *Political Risk Services Inc.* publishes a monthly report on the political and financial risks of more than 140 countries, which analyses each country's level of risk in both areas using the *International Country Risk Guide* (ICRG) ([Political Risk Services Inc., 2016](#)).

The Corruption Perception Index (CPI) is based on a survey of businesses and individuals around the world. It consists of twelve sub-indices, which are listed in Appendices. It is considered a composite index because its data come from several surveys—at least three for each country surveyed—and currently these surveys cover 180 countries ([Anastasiou & Panagiotopoulou, 2020](#); [Komninos et al., 2020](#)). The CPI index is based on values between 0 and 100. Before 2011, values between 0 and 10 were used. The value of 0 indicates the maximum corruption, while the value of 100 indicates the sense that there is no corruption at all in the country. This index is used throughout this paper. However the use of this index may create some problems when used as an important criterion for the actual levels of corruption in a country ([Malito, 2014](#)):

- The sub-indices of the final index represent different forms of corruption, as there is no universally accepted definition of corruption. Each sub-index is constructed using a different research methodology.
- Information problems arise because of the different perspectives of different countries. In addition, individuals' biased opinions flourish.
- Many countries rank higher on a corruption scale because of the value of their index. However, this index is often not comparable with other years' results.

2. Relating Corruption with per Capita GDP & per Capita GDP Growth

Experts suggest that the growth rate of GDP per capita is the best measure of the

economic growth of a country. However, apart from the per capita GDP growth rate of a country, it is also of particular significance whether the per capita GDP *converges* at some level, determined by the internal factors of a country's economic policy or by externally imposed criteria set for the country (Anastasiou et al., 2022; Anastasiou et al., 2021). The basic condition for convergence is the negative relation of the per capita GDP growth rate (g_{yi}) of the country (i) and the per capita GDP (y_i) of the same country (i). This relationship as a function has the form:

$$g_{yi} = f(\log y_i) \quad (1)$$

where:

g_{yi} = The per capita GDP growth rate of the country (i)

y_i = The per capita GDP of country (i)

For a constant growth rate (g_{yit_2}), Equation (1) is written as:

$$y_{it_2} = y_{it_1} e^{g_{yit_2} \cdot \Delta t} \quad (2)$$

where:

g_{yit_2} = The mean per capita GDP growth rate of country (i), during the period of time Δt (where $\Delta t = t_2 - t_1$),

y_{it_1} = The initial per capita GDP of country (i) at time (t_1)

y_{it_2} = The final per capita GDP of country (i) at time (t_2)

And in logarithmic form:

$$g_{yit_2} = (\ln y_{it_2} - \ln y_{it_1}) / \Delta t \quad (3)$$

For ($t_1 = t$) and ($t_2 = t + 1$), i.e. for a period of time of one year, then $\Delta t = 1$ and Equation (3) is written as a logarithmic difference for the estimation of the annual per capita GDP growth rate:

$$g_{yit(t+1)} = \ln y_{i(t+1)} - \ln y_{it} \quad (4)$$

To take into account socio-economic factors, Barro (Barro, 1991) used an empirical form of Equation (4), which includes a set of variables such as health systems and schools. His equation is as follows (Akçay, 2002):

$$g_{yit_2} = a \log y_{it_1} + cX + d \quad (5)$$

where:

X = A group of variables which include socio-economic effects

a, c, d = Constants ($a < 0$ for the cases of economic convergence)

Mauro (Mauro, 1995) analysed the relationship between corruption and annual economic growth over a period from 1960 to 1985, using data from the BI corruption index for 67 countries for the time period 1980-1983. He found that countries with low levels of corruption had higher average annual growth rates than countries with high levels of corruption. He also found that the improvement of the corruption index had a positive effect on GDP growth and investment. This was largely due to the fact that the improvement of the corruption index by one degree increased GDP per capita by 0.5% and investment by 5% of GDP per year. Using the extended Barro equation (Equation (5)), Mauro

(Mauro, 1995) extended the equation to include corruption (Akçay, 2002):

$$g_{y_{it_2}} = a \log y_{it_1} + bCor_{it_1} + cX + d \quad (6)$$

where:

Cor_{it_1} = Corruption index of country (i) at time (t_1)

X = A group of variables which include socio-economic effects

a, b, c, d = Constants ($a < 0, b > 0$)

Mauro (Mauro, 1998) used the ICRG index for 1982 to 1995 and the BI index for 1980 to 1983. For a sample of 106 countries, he studied the effect of corruption on growth and investment, where the dependent variables were the average rate of investment and GDP growth for each country. Mauro found that countries with improvement of the corruption indices by a single unit, had a 4% higher investment growth rate and a 0.5% higher GDP per capita growth rate, over the time period from 1960 to 1985.

Ehrlich and Lui (Ehrlich & Lui, 1999) found that countries with higher levels of corruption had lower economic growth rates. They studied the data from 152 countries from 1960 to 1992 and found that the higher the level of corruption, the lower the rate of growth, while it became clear that the impact of corruption on economic growth in developed countries is lower.

Also, Akçay (Akçay, 2002) studied the effect of corruption on economic growth for 54 different developing countries over a period from 1960 to 1995. He used Mauro's equation (Equation (6)), which calculates the Mauro index (X) with 8 variables (population growth, inflation, government expenditure as a percentage of GDP, ratio of students to teachers, ratio of gross domestic investment to GDP, etc.) in addition to the corruption index ICRG. Akçay found that countries with low levels of corruption had higher rates of economic growth than countries with a high corruption index.

3. Specifying a Correlation between CPI & GDP per Capita

Shao et al. (Shao et al., 2007) suggest a positive correlation between the Corruption Perceptions Index (CPI) and a country's per capita GDP (y) when comparing results of 90 to 140 countries, from 2001 to 2005, expressed by:

$$CPI \sim y^\mu \quad (7)$$

A positive exponent (μ) indicates that countries with high GDP per capita are less corrupted. Shao et al. (Shao et al., 2007) proved that higher CPI values indicate higher GDP per capita. This means that countries with wide differences in their CPI have similar differences in their GDP per capita, i.e. the higher the value of CPI the higher the per capita GDP. The exponent (μ) takes a general value of 0.27 ± 0.02 . Furthermore, Shao et al. (Shao et al., 2007) studied the relationship between the CPI and the per capita GDP growth rate of four groups of countries according to their per capita income, following the income classification of the World Bank (World Bank, 2022a). They found that countries with low corruption (i.e. high values of CPI), show high rates of economic growth (high values of per capita GDP growth rate).

Podobnik et al. (Podobnik et al., 2008) found that functional dependence can be modelled with a power law function as follows:

$$CPI = Ny^{\mu} \quad (8)$$

where:

N = Coefficient ($N > 0$)

Podobnik et al (Podobnik et al., 2008), using 2006 data, found that the value of the exponent (μ) was about 0.23, while the value of coefficient (N) was about 0.56, using the [0, 10] scale of CPI.

Also, Podobnik et al. (Podobnik et al., 2008) used data from the five-year period 1999 to 2004 to determine the relationship between changes in the CPI values [$\Delta(CPI)$] and changes in the GDP annual growth rate (g), as follows:

$$g_{yit_2} = m\Delta(CPI_{it_2}) + u_i \quad (9)$$

where:

u_i = Constant

For almost all countries, it was found that in all countries there is a positive slope (m) of the straight line expressed by Equation (9), equal to 0.09. Therefore, each unit increase in the CPI of the [0, 10] scale indicates a 1.7% increase in the annual GDP growth rate (g). Podobnik et al. (Podobnik et al., 2008) used Equation (4) to estimate the average per capita GDP annual growth rate (g), knowing the change in CPI value [$\Delta(CPI)$].

Vlachos (Vlachos, 2013), studying the relevant scatter diagram on a log-log scale for 172 countries, for the period of time 1993-2012, found that the apparent linear relationship provided exponent values (μ) of Equation (8), equal to 0.21. For low-income countries, he also found that there is no positive exponential relationship between (CPI) and the average per capita GDP (y). Also, for a total of 119 countries and for the period of time 2003-2012, he found that the linear trend line of Equation (9) showed a positive slope (m) equal to 0.149 for all countries. For the group of high and upper-middle-income countries, he found a positive slope equal to 0.173 and for the group of lower-medium countries and low income countries he found a small positive slope equal to 0.042.

Finally, Papageorgiou et al. (Papageorgiou et al., 2018) studied the relationship between the average GDP per capita (y) at current prices, in \$ U.S. and the average corruption perception index (CPI), during the decade 2006-2015 in Europe, and the relation between the average per capita GDP growth rate (g) and the change of the average corruption perception index [$\Delta(CPI)$] during the same time period in Europe. They showed that the value of exponent (μ) of Equation (8) was equal to 0.3393 for all European countries, 0.3451 for the 31 countries of the European Economic Area, was 0.3476 for the 28 countries of the European Union and 0.3047 for the 19 countries of Euro Zone. They also found that the value of the slope of the straight line (m) of Equation (9) was equal to 0.0186 for all European countries, 0.0135 for the 31 countries of European Economic Area, 0.0136 for the 28 countries of European Union and was 0.0164 for the 19 countries of Euro Zone.

4. Examining the Relation of CPI & per Capita GDP and Use of GIS

In the present study, we examined the relationship between corruption and income levels in Europe for the period 2005-2021. Specifically, we studied 1) the relationship between the average per capita GDP (y) at current prices, in \$ U.S. and the average corruption perception index (CPI), during the mentioned time period, and 2) the relation between the average per capita GDP growth rate (g) and the change of the average corruption perception index [$\Delta(CPI)$] during the same time period. The source of the values for per capita GDP was the World Bank, while source of the values of CPI was the Transparency International organization. For the purpose of this survey Equations (8) and (9) were used, while all used values of CPI before 2012, having values of [0, 10] scale, were converted to [0, 100] scale in order to obtain compatibility for our analysis.

The groups of European countries used were:

- 46 European countries (ALL European countries).
- 31 countries member states of the European Economic Area (EEA-31).
- 27 countries member states the European Union (EU-27).
- 19 countries member states of the Euro-zone (EZ-19).
- 15 countries including Central and Eastern Europe countries, Turkey and Kazakhstan, which are not members of the EU and EEA (CEE-15).

GIS is effective at processing data and presenting the results in many visual formats. This is because GIS provides access to data from multiple sources through feedback loops. They can also be used for data integration, modelling, simulation and analysis. GIS is also a platform for creating a flexible, dynamic and adaptive framework for integrating geospatial data. With the proliferation of programming and scripting languages, new spatial analysis and visualisation capabilities are becoming available through the use of spatial libraries. This is because current GIS packages are effective at handling complex data thanks to their databases and languages combined with them (Murray, 2010; Sritart & Miyazaki, 2022).

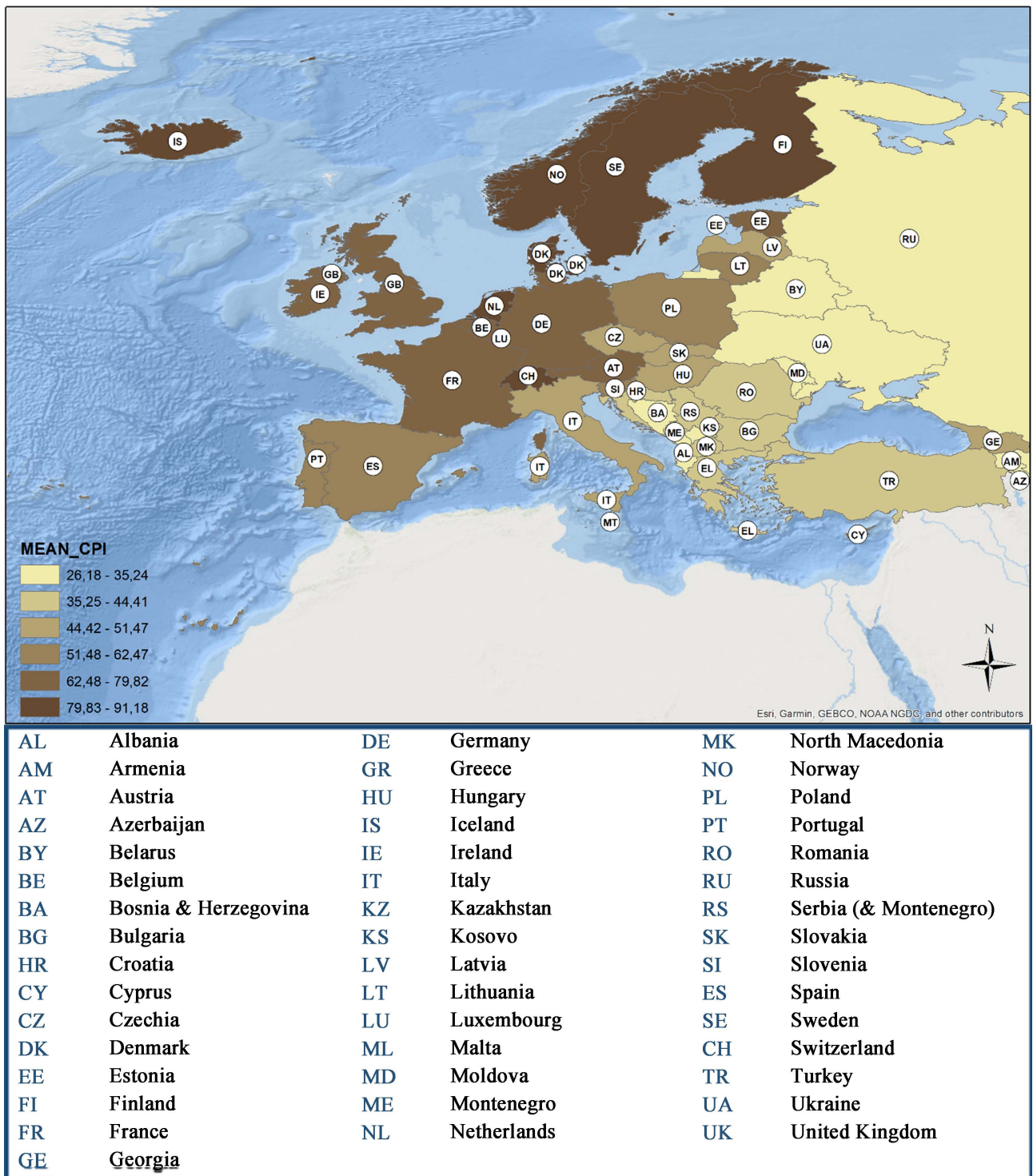
In the current study, the obtained results for the five European regions and the corresponding values of exponent (μ) and slope (m) were used as a geospatial database in order to produce charts as visual information about the relations of CPI and & per capita GDP, using GIS.

As shown in **Table 1**, **Figures 1-3**, for all European countries, there is a positive

Table 1. Summarized results of survey.

Group of countries	Exponent μ (Equation (8))	Sig.	Slope m (Equation (9))	Sig.
46 European countries	0.3378	0.000	0.0181	0.000
31 EEA countries	0.3382	0.000	0.0183	0.001
27 EU countries	0.3384	0.000	0.0188	0.004
19 EZ countries	0.2947	0.000	0.0187	0.036
15 non-EU TCEE countries	0.0031		0.0003	

Source: Authors' calculations. Red numbers denote that there is no statistical significance.

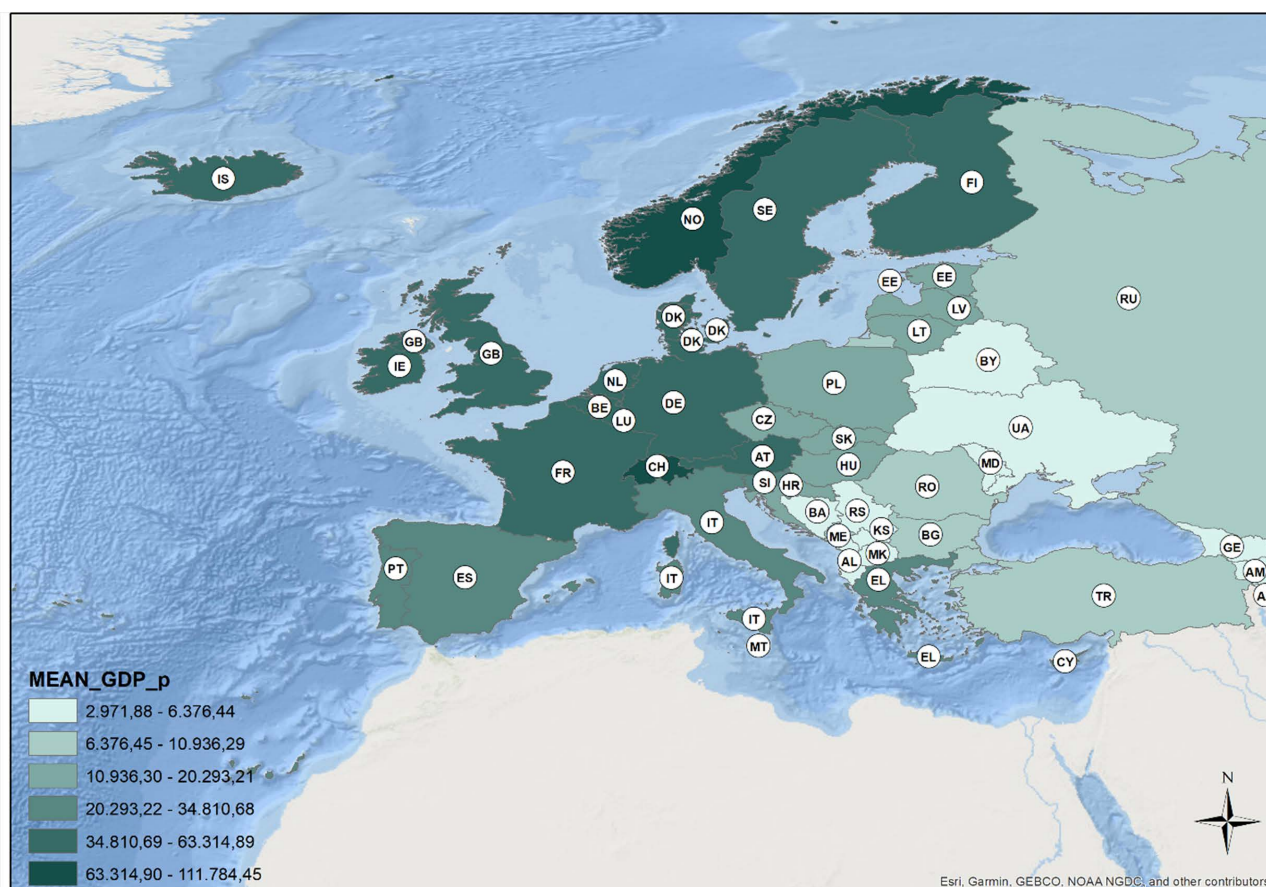


Source: Authors' calculations.

Figure 1. Classification of European Countries according to their mean value of CPI during the period of time 2005-2021.

relationship between the level of corruption (*CPI*) and the per capita GDP (*y*), represented by the exponent value (μ), equal to 0.3378. This value is 0.3382 for the 31 countries of the European Economic Area, 0.3384 for the 27 countries of

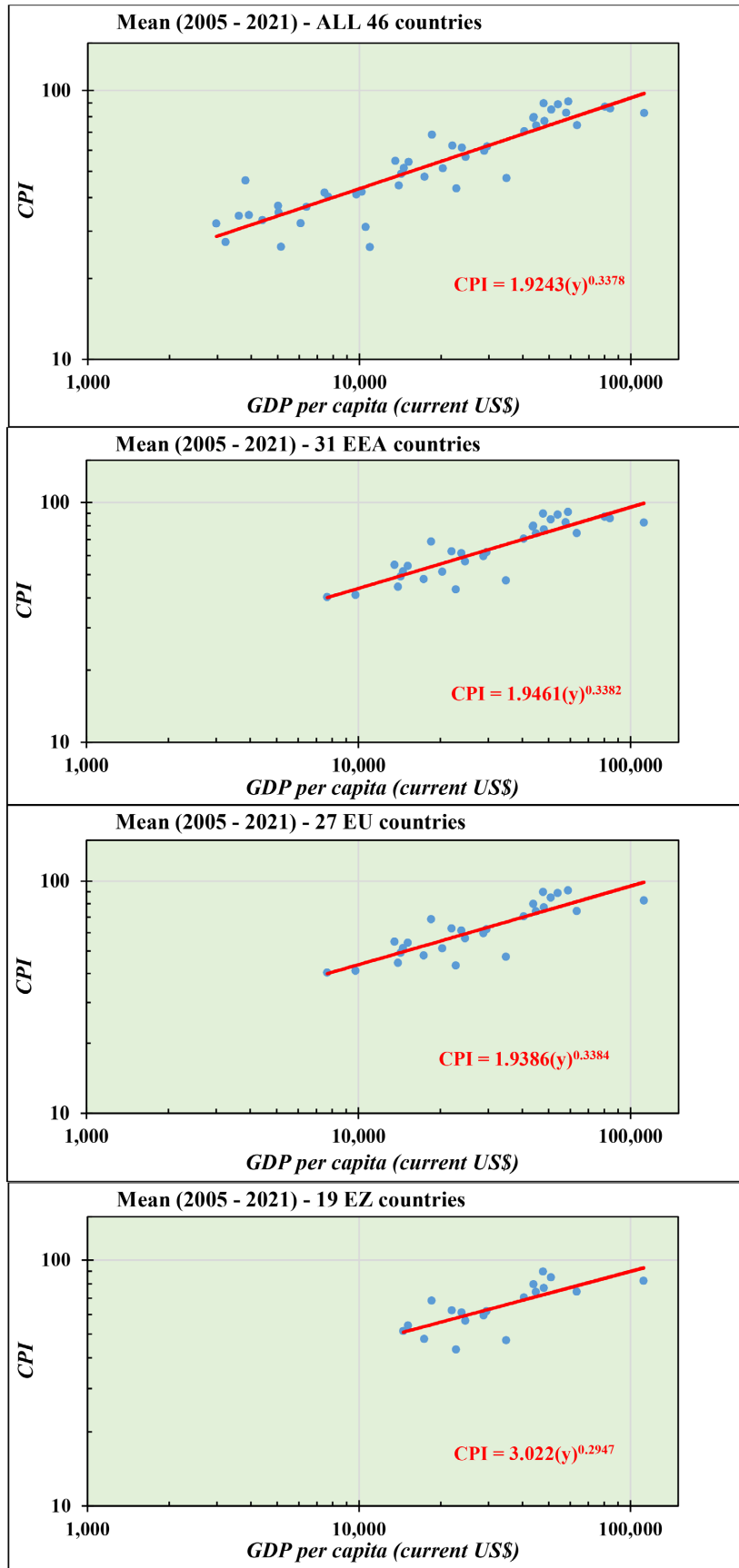
the European Union and 0.2947 for the 19 countries of the Eurozone. In general, it is obvious that if two countries within the European Economic Area, the European Union or the Eurozone, have different CPI values, then these countries

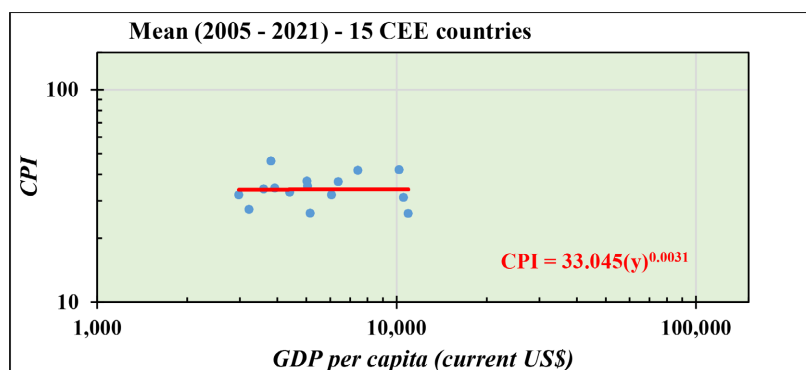


AL	Albania	DE	Germany	MK	North Macedonia
AM	Armenia	GR	Greece	NO	Norway
AT	Austria	HU	Hungary	PL	Poland
AZ	Azerbaijan	IS	Iceland	PT	Portugal
BY	Belarus	IE	Ireland	RO	Romania
BE	Belgium	IT	Italy	RU	Russia
BA	Bosnia & Herzegovina	KZ	Kazakhstan	RS	Serbia (& Montenegro)
BG	Bulgaria	KS	Kosovo	SK	Slovakia
HR	Croatia	LV	Latvia	SI	Slovenia
CY	Cyprus	LT	Lithuania	ES	Spain
CZ	Czechia	LU	Luxembourg	SE	Sweden
DK	Denmark	ML	Malta	CH	Switzerland
EE	Estonia	MD	Moldova	TR	Turkey
FI	Finland	ME	Montenegro	UA	Ukraine
FR	France	NL	Netherlands	UK	United Kingdom
GE	Georgia				

Source: Authors' calculations.

Figure 2. Classification of European Countries according to their mean value of GDP pc during the period of time 2005-2021.





Source: Authors' calculations.

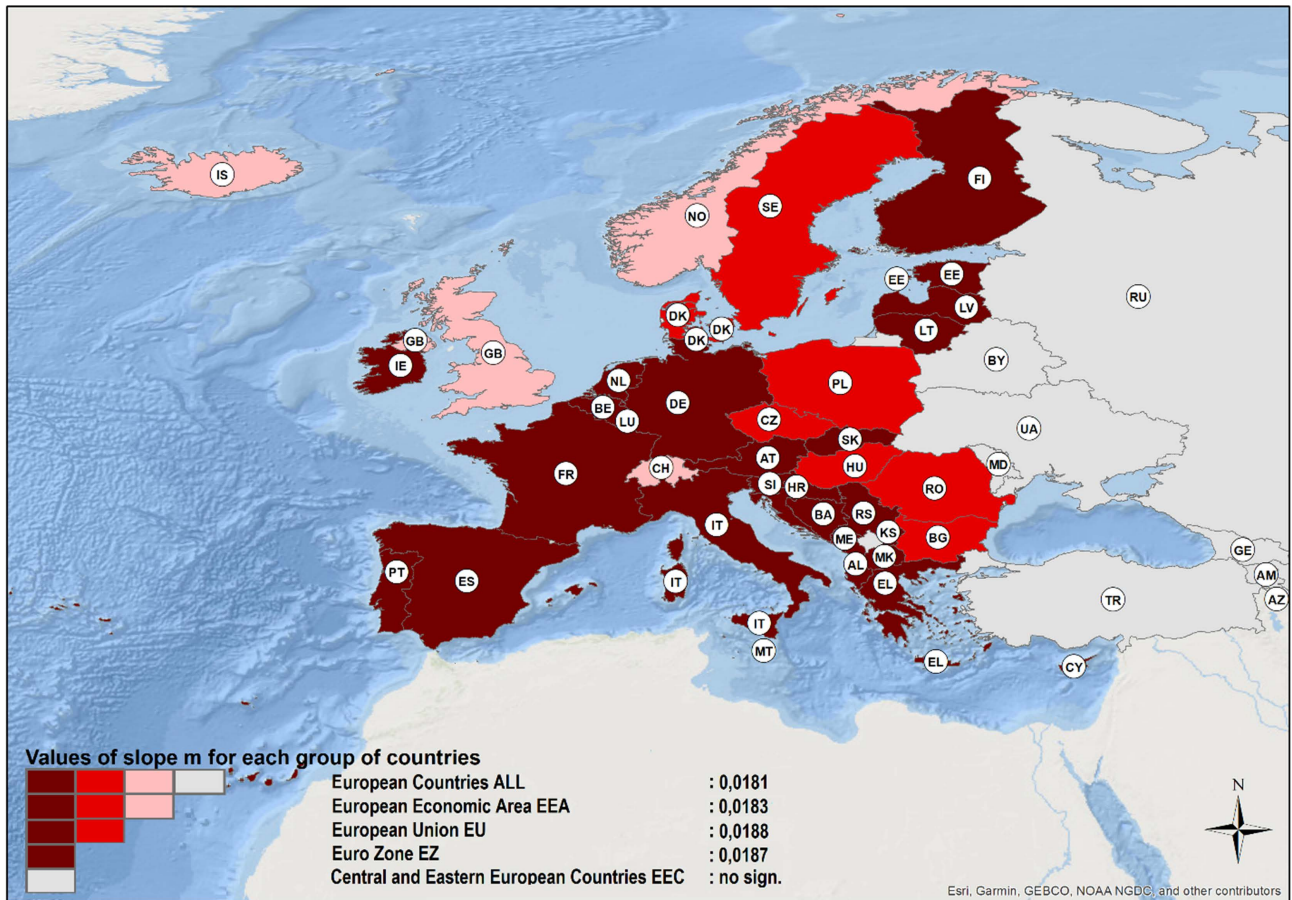
Figure 3. Relation between CPI and GDP per capita.

should also have different values in their per capita GDP, so that the country has the higher CPI value (i.e. lower perceived corruption), its GDP per capita has also a higher value. It was confirmed that there is a statistically significant positive exponential relationship between the average CPI and the average per capita GDP, in most European countries. However, for the 15 countries of the Central and Eastern European countries, including Turkey and Kazakhstan, which are not members of the European Economic Area, the European Union or the Eurozone, the exponent values (μ) are almost zero (0.0031), but without statistical significance.

Regarding the relationship between the average growth rate of GDP per capita (g), and the change in the average corruption perception index [$\Delta(CPI)$], as shown in **Table 1**, **Figure 4** and **Figure 5**, there is a positive linear relationship between the average growth rate of GDP per capita and the change in the corruption level, for all European countries, expressed by the slope of the straight line (m) which is 0.0181. This means that for every unit increase in the CPI value in the [0, 100] corruption scale, the average per capita GDP annual growth rate will increase by 1.81%. The corresponding values are 1.83% for the 31 countries of European Economic Area, 1.88% for the 27 countries of European Union and 1.87% for the 19 countries of Eurozone, indicating a statistically significant positive relationship between the growth rate of GDP per capita and the change in the CPI. Finally, for the 15 countries of Central and Eastern Europe countries, including Turkey and Kazakhstan, which are not members of the European Economic Area, the European Union or the Eurozone, for every unit of increase in the CPI value, the growth rate of GDP per capita will increase by 0.03%, although the result for the last case is not statistically significant.

5. Conclusion

Data shows that higher levels of corruption lead to lower GDP per capita. This has been demonstrated by previous statistical analysis. However, some countries such as Turkey, Kazakhstan and Central and Eastern Europe don't follow this trend. CPI scores have a significant positive correlation with GDP per capita for



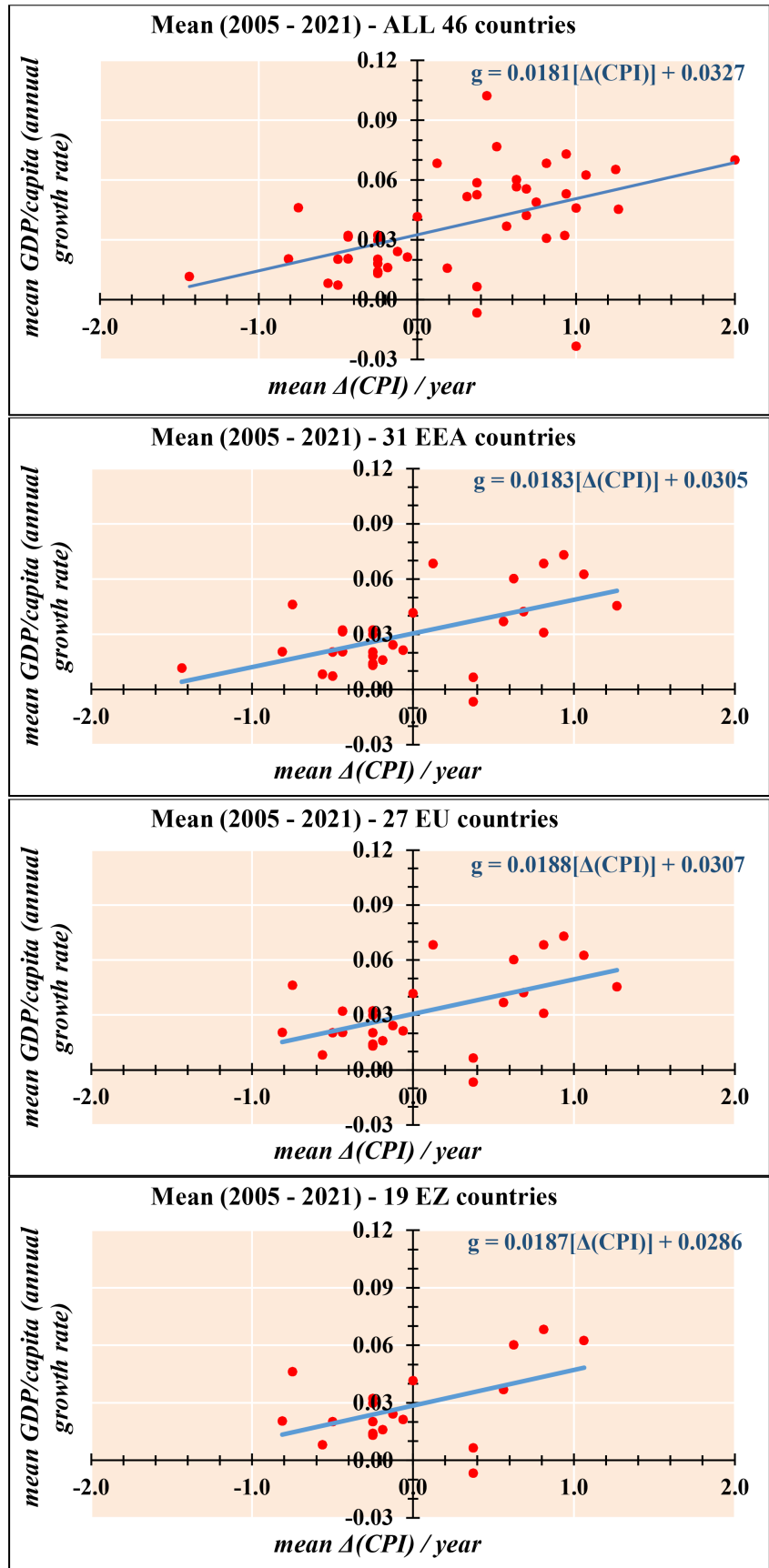
AL	Albania	DE	Germany	MK	North Macedonia
AM	Armenia	GR	Greece	NO	Norway
AT	Austria	HU	Hungary	PL	Poland
AZ	Azerbaijan	IS	Iceland	PT	Portugal
BY	Belarus	IE	Ireland	RO	Romania
BE	Belgium	IT	Italy	RU	Russia
BA	Bosnia & Herzegovina	KZ	Kazakhstan	RS	Serbia (& Montenegro)
BG	Bulgaria	KS	Kosovo	SK	Slovakia
HR	Croatia	LV	Latvia	SI	Slovenia
CY	Cyprus	LT	Lithuania	ES	Spain
CZ	Czechia	LU	Luxembourg	SE	Sweden
DK	Denmark	ML	Malta	CH	Switzerland
EE	Estonia	MD	Moldova	TR	Turkey
FI	Finland	ME	Montenegro	UA	Ukraine
FR	France	NL	Netherlands	UK	United Kingdom
GE	Georgia				

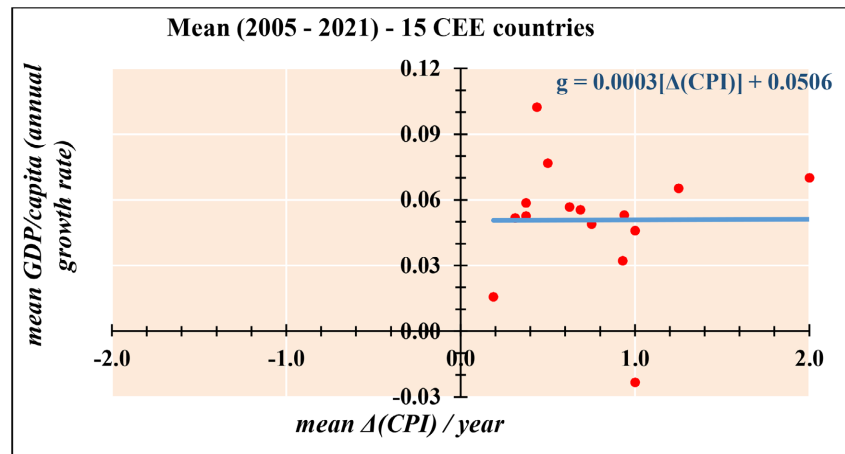
Source: Authors' calculations.

Figure 4. Classification of groups of countries according to the calculated slope m value.

each country. This is because different countries with different score values also have different GDP per capita values.

After reducing corruption, European economies grew faster. This was evident





Source: Authors' calculations.

Figure 5. Relation between per capita GDP annual growth rate and $\Delta(\text{CPI})/\text{year}$.

when looking at data from all European countries except the EEC and EZ countries. Moreover, a positive relationship between GDP and corruption was observed - with more than half of European countries showing a significant increase in both economic growth and prosperity.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendices

Appendix 1

Table A1. Sub-indices for the estimation of Corruption Perception Index (CPI).

Code	Description
AFDB	African Development Bank - Governance Ratings
BF (SGI)	Bertelsmann Foundation - Sustainable Governance Indicators
BF (BTI)	Bertelsmann Foundation - Transformation Index
IMD	IMD World Competitiveness Yearbook
ICRG	Political Risk Services - Country Risk Guide
WB	World Bank - Country Performance and Institutional Assessment
WEF	World Economic Forum - Executive Opinion Survey
WJP	World Justice Project - Rule of Law Index
EIU	Economist Intelligence Unit - Country Risk Assessment
GI	Global Insight - Country Risk Ratings
PERC	Political and Economic Risk Consultancy - Asian Intelligence
FH	Freedom House - Nations in Transit

Source: Transparency International ([Transparency International, 2021](#)).

Appendix 2. Corruption Perception Indices of European Countries

Table A2. Corruption perception indices of all European countries for years 2005-2021.

Country	Code	Corruption Perception Index CPI																			Mean CPI		
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021					
Albania	ALB	24	26	29	34	32	33	31	33	31	33	31	33	36	39	38	36	35	36	35	36	35	33.00
Armenia	ARM	29	29	30	29	27	26	26	34	36	37	35	33	35	33	35	35	35	42	49	49	49	34.18
Austria	AUT	87	86	81	81	79	79	78	69	69	72	76	75	75	75	75	76	77	76	74	74	74	77.06
Azerbaijan	AZE	22	24	21	19	23	24	24	27	28	29	29	30	29	30	31	25	30	30	30	30	30	26.24
Belarus	BLR	26	21	21	20	24	25	24	31	29	31	32	40	44	44	44	44	45	47	41	41	41	32.06
Belgium	BEL	74	73	71	73	71	71	75	75	75	76	77	77	75	75	75	75	75	76	73	73	73	74.24
Bosnia & Herzegovina	BIH	29	29	33	32	30	32	32	42	42	39	38	39	38	39	38	38	36	35	35	35	35	35.24
Bulgaria	BGR	40	40	41	36	38	36	33	41	41	43	41	41	41	41	43	42	43	44	42	42	42	40.29
Croatia	HRV	34	34	41	44	41	41	40	46	48	48	51	49	49	49	49	48	47	47	47	47	47	44.41
Cyprus	CYP	57	56	53	64	66	63	63	66	63	63	61	55	57	55	57	59	58	57	53	53	53	59.65
Czechia	CZE	43	48	52	52	49	46	44	49	48	51	56	55	57	55	57	59	56	54	54	54	54	51.35
Denmark	DNK	95	95	94	93	93	93	94	90	91	92	91	90	88	88	88	88	87	88	88	88	88	91.18
Estonia	EST	64	67	65	66	66	65	64	64	68	69	70	70	71	70	71	73	74	75	74	75	74	68.53
Finland	FIN	96	96	94	90	89	92	94	90	89	89	90	89	85	85	85	85	86	85	88	85	88	89.82
France	FRA	75	74	73	69	69	68	70	71	71	69	70	69	70	70	70	72	69	69	71	69	71	70.53
Georgia	GEO	23	28	34	39	41	38	41	52	49	52	52	57	56	56	56	58	56	56	55	55	55	46.29
Germany	DEU	82	80	78	79	80	79	80	79	78	79	81	81	81	81	81	80	80	80	80	80	80	79.82
Greece	GRC	43	44	46	47	38	35	34	36	40	43	46	44	48	44	48	45	48	50	49	49	49	43.29
Hungary	HUN	50	52	53	51	51	47	46	55	54	54	51	48	45	48	45	46	44	44	43	43	43	49.06
Iceland	ISL	97	96	92	89	87	85	83	82	78	79	79	78	77	78	77	76	78	75	74	75	74	82.65
Ireland	IRL	74	74	75	77	80	80	75	69	72	74	75	73	74	73	74	73	74	72	74	72	74	74.41
Italy	ITA	50	49	52	48	43	39	39	42	43	43	44	47	50	50	52	53	53	53	56	56	56	47.24
Kazakhstan	KAZ								28	26	29	28	29	31	31	31	34	38	37	37	37	37	31.10

Continued		28	29	34	33	33	33	36	39	37	36	36	39	34.42
Kosovo	KSV													
Latvia	LVA	42	47	48	50	45	43	42	49	53	55	56	57	51.47
Lithuania	LTU	48	48	48	46	49	50	48	54	57	58	59	59	54.29
Luxembourg	LUX	85	86	84	83	82	85	85	80	80	82	85	81	82.47
Malta	MLT	66	64	58	58	52	56	56	57	56	55	60	54	56.71
Moldova	MDA	29	32	28	29	33	29	29	36	35	33	30	31	32.00
Montenegro	MNE			33	34	39	37	40	41	44	42	44	45	41.73
Netherlands	NLD	86	87	90	89	89	88	89	84	83	83	84	82	85.00
North Macedonia	MKD	27	27	33	36	38	41	39	43	44	45	42	37	37.24
Norway	NOR	89	88	87	79	86	86	90	85	86	86	88	85	85.71
Poland	POL		37	42	46	50	53	55	58	60	61	63	62	54.81
Portugal	PRT	65	66	65	61	58	60	61	63	62	63	64	62	62.47
Romania	ROU	30	31	37	38	38	37	36	44	43	43	46	48	41.12
Russia	RUS	24	25	23	21	22	21	24	28	28	27	29	29	26.18
Serbia (& Montenegro)	SRB	28	30	34	34	35	35	33	39	42	41	40	42	36.94
Slovakia	SVK	43	47	49	50	45	43	40	46	47	50	51	50	47.82
Slovenia	SVN	61	64	66	67	66	64	59	61	57	58	60	61	61.29
Spain	ESP	70	68	67	65	61	61	62	65	59	60	58	57	62.00
Sweden	SWE	92	92	93	93	92	92	93	88	89	87	89	88	88.94
Switzerland	CHE	91	91	90	90	90	87	88	86	85	86	86	85	87.06
Turkey	TUR	35	38	41	46	44	44	42	49	50	45	42	41	42.06
Ukraine	UKR	26	28	27	25	22	24	23	26	25	26	27	29	27.35
United Kingdom	GBR	86	86	84	77	77	76	78	74	76	78	81	81	79.29

Source: Transparency International (Transparency International, 2021). ■: Data Not available. CPI indicators before 2012 have values of [0, 10] scale and were converted to [0, 100] scale in order to obtain compatibility for our analysis.

Appendix 3. GDP Percapita of European Countries

Table A3. GDP per capita of all European Countries for years 2005-2021 (current U.S. \$).

Country	Code	Gross domestic product (GDP) per capita (Current US\$)																			Mean GDPpc
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021			
Albania	ALB	2.67379	2.97274	3.59504	4.37054	4.11413	4.09435	4.43714	4.24763	4.41306	4.57863	3.95280	4.12406	4.53102	5.28766	5.39622	5.33216	6.49439	4.38914		
Armenia	ARM	1.64376	2.15815	3.13928	4.01086	2.99434	3.21838	3.52581	3.68184	3.83817	3.98623	3.60729	3.59183	3.91453	4.22054	4.60465	4.26602	4.67001	3.59245		
Austria	AUT	38.41746	40.66933	46.91534	51.91998	48.15332	46.90376	51.44228	48.56492	50.73113	51.78638	44.19582	45.30759	47.42916	51.48658	50.11440	48.58866	53.26793	47.99377		
Azerbaijan	AZE	1.57840	2.47308	3.85144	5.57460	4.95029	5.84353	7.18969	7.49629	7.87576	7.89131	5.50031	3.88074	4.14709	4.73984	4.80575	4.22991	5.38403	5.14189		
Belarus	BLR	3.12581	3.84743	4.73566	6.37737	5.35258	6.03369	6.52717	6.95313	7.99813	8.34140	5.96705	5.03968	5.78567	6.36006	6.83772	6.55543	7.30370	6.06716		
Belgium	BEL	36.80970	38.70511	44.31917	48.30340	44.76029	44.18495	47.41057	44.67056	46.75795	47.76407	41.00830	42.01262	44.19848	47.54921	46.59911	45.18937	51.76779	44.82416		
Bosnia & Herzegovina	BIH	2.98060	3.41651	4.19337	5.09095	4.71469	4.63551	5.09255	4.77707	5.12966	5.33036	4.72969	4.99497	5.39427	6.07035	6.11976	6.08237	6.91644	5.03936		
Bulgaria	BGR	3.89991	4.52305	5.88510	7.26574	6.98823	6.85300	7.84917	7.43248	7.68193	7.90179	7.07468	7.56948	8.36629	9.44670	9.87927	10.07920	11.63497	7.66653		
Croatia	HRV	10.62151	11.79747	14.04632	16.41659	14.65304	14.06752	14.75718	13.40166	13.83773	13.76237	11.93338	12.52774	13.62929	15.22756	15.31177	14.13249	17.39877	13.97190		
Cyprus	CYP	24.95926	26.72932	31.24493	35.39736	32.10924	31.02364	32.39639	28.91216	27.72919	27.16333	23.40834	24.60592	26.60888	29.33411	29.20608	27.68157	30.79848	28.78283		
Czechia	CZE	13.43067	15.26180	18.46655	22.80458	19.86170	19.96007	21.87127	19.87080	20.13317	19.89092	17.82970	18.57523	20.63620	23.41974	23.66015	22.93350	26.37850	20.29321		
Denmark	DNK	48.79983	52.02700	58.48705	64.32206	58.16328	58.04140	61.75365	58.50751	61.19119	62.54898	53.25486	54.66400	57.61010	61.59193	59.77574	61.06332	67.80305	58.80029		
Estonia	EST	10.41264	12.63940	16.74458	18.20497	14.71174	14.66304	17.48780	17.40321	19.05600	20.26107	17.40204	18.29534	20.43777	23.06356	23.39788	23.05436	27.28066	18.50094		
Finland	FIN	39.05485	41.22260	48.47639	53.77279	47.48148	46.50530	51.14893	47.70806	49.89222	50.32724	42.80191	43.81403	46.41214	49.98891	48.62864	49.16084	53.98261	47.66935		
France	FRA	34.77315	36.47416	41.56120	45.51930	41.74024	40.67799	43.84811	40.87236	42.60504	43.06855	36.65292	37.06253	38.78105	41.59280	40.57864	39.03712	43.51854	40.49198		
Georgia	GEO	1.64276	1.99606	2.63535	3.32474	2.82267	3.23330	4.02174	4.42182	4.62375	4.73919	4.01419	4.06217	4.35700	4.72204	4.69615	4.25574	5.04239	3.80065		
Germany	DEU	34.52024	36.35388	41.64008	45.61271	41.65037	41.57246	46.70590	43.85585	46.29892	48.02387	41.10326	42.13612	44.65259	47.97361	46.79490	46.25269	50.80179	43.87937		
Greece	GRC	22.56015	24.82194	28.86397	32.12798	29.82876	26.71665	25.48388	21.91300	21.78779	21.61671	18.08388	17.92397	18.58209	19.75699	19.13376	17.64723	20.27654	22.77208		
Hungary	HUN	11.22593	11.49310	13.94497	15.77719	13.08179	13.22308	14.24026	12.98918	13.71995	14.29883	12.72071	13.10738	14.62370	16.42737	16.73566	16.07597	18.77267	14.26222		
Iceland	ISL	56.79485	57.49293	69.49573	56.94337	41.30127	43.23707	47.71459	45.99555	49.80498	54.57674	52.95168	61.98793	72.01015	74.46980	68.94146	59.26403	68.38377	57.72741		
Ireland	IRL	50.93302	54.32916	61.39642	61.35311	52.13309	48.65537	52.17711	49.02602	51.53303	55.59985	62.01248	62.86164	69.77403	79.10760	80.88662	85.42254	99.15210	63.31489		
Italy	ITA	32.05509	33.52973	37.87075	40.94491	37.22676	36.03564	38.64964	35.05152	35.56008	35.56572	30.24239	30.96073	32.40672	34.62217	33.67348	31.83497	35.55128	34.81068		
Kazakhstan	KAZ	3.77128	5.29158	6.77141	8.45802	7.16522	9.07049	11.63400	12.38670	13.89063	12.80726	10.51077	7.71484	9.24758	9.81263	9.81260	9.12164	10.04149	10.53461		
Kosovo	KSV				2.96545	2.84756	3.00956	3.54089	3.41086	3.70478	3.90268	3.52077	3.75956	4.00938	4.38405	4.41611	4.31081	4.98658	3.91300		
Latvia	LVA	7.59490	9.72345	14.11353	16.46714	12.33193	11.42099	13.33896	13.84734	15.00749	15.74239	13.78646	14.33175	15.69512	17.86503	17.92684	17.70395	20.64217	14.56114		

Continued

Lithuania	7.85477	9.23071	12.28545	14.94500	11.82078	11.98751	14.37695	14.36771	15.72965	16.55102	14.26396	15.00831	16.88541	19.18618	19.57577	20.23230	23.43339	15.16087
Luxembourg	80.98814	90.78880	107.47532	120.42214	109.41975	110.88599	119.02506	112.58468	120.00014	123.67870	105.46201	106.89929	110.19321	117.25474	113.21871	116.35616	135.68279	111.78445
Malta	15.88817	16.72388	19.48587	22.20536	21.08328	21.79917	23.15555	22.52764	24.77108	26.75027	24.92160	25.62454	28.85702	31.57312	31.18565	28.94646	33.25742	24.63295
Moldova	1.03471	1.18338	1.53169	2.11120	1.89901	2.43754	2.94225	3.04573	3.32205	3.32879	2.73246	2.88044	3.50969	4.23063	4.49211	4.52576	5.31453	2.97188
Montenegro	3.67462	4.42568	5.97639	7.36775	6.72711	6.68848	7.32893	6.58672	7.18886	7.38787	6.51719	7.03344	7.80336	8.85038	8.90989	7.69463	9.36702	7.42854
Netherlands	41.99471	44.90094	51.79921	57.87994	52.72221	50.99975	54.23031	50.07014	52.19890	52.90054	45.19340	46.03911	48.67522	53.04453	52.47627	52.39603	58.06100	50.91660
North Macedonia	3.07268	3.36297	4.07939	4.84125	4.58471	4.57769	5.09810	4.72831	5.24106	5.49574	4.86155	5.14959	5.45049	6.10874	6.07039	5.84647	6.72090	5.01706
Norway	66.81048	74.14832	85.13996	96.94410	79.97770	87.69379	100.60056	101.52414	102.91345	97.01918	74.35552	70.46056	75.49675	82.26781	75.71975	67.32968	89.20275	83.97674
Poland	8.02151	9.03541	11.25452	13.99603	11.52606	12.61301	13.87956	13.09727	13.69647	14.27131	12.57850	12.44744	13.86468	15.46848	15.73220	15.74245	17.84092	13.56527
Portugal	18.78013	19.83945	22.81106	24.94904	23.15122	22.52064	23.21730	20.56371	21.65320	22.10370	19.25011	19.99197	21.49043	23.56255	23.33082	22.19457	24.26218	21.98071
Romania	4.61793	5.75750	8.36017	10.33504	8.54812	8.21408	9.09922	8.50710	9.54785	10.04368	8.96915	9.54859	10.80701	12.39898	12.89935	12.95657	14.86191	9.73954
Russia	5.32346	6.92019	9.10125	11.63527	8.56281	10.67500	14.31108	15.42088	15.97464	14.09565	9.31301	8.70490	10.72033	11.28736	11.53625	10.16198	12.17279	10.93629
Serbia (& Montenegro)	3.72048	4.38262	5.84848	7.10104	6.16911	5.73542	6.80916	6.01595	6.75507	6.60006	5.58898	5.76520	6.29254	7.25240	7.41720	7.73069	9.21499	6.37644
Slovakia	11.69011	13.17078	16.10606	18.75358	16.59721	16.84777	18.43013	17.42983	18.20842	18.65579	16.34222	16.51129	17.53805	19.38998	19.30355	19.26651	21.08785	17.37201
Slovenia	18.09891	19.67297	23.81789	27.59560	24.79213	23.55248	25.12802	22.64181	23.50328	24.24717	20.89017	21.67836	23.51403	26.11686	25.94295	25.48950	29.20082	23.87429
Spain	26.42915	28.38908	32.59135	35.51072	32.16950	30.53248	31.67790	28.32281	29.06781	29.50079	25.74237	26.52335	28.17017	30.36458	29.55449	27.05642	30.11571	29.51286
Sweden	43.43706	46.59360	53.70001	56.15255	46.94696	52.86904	60.75576	58.03782	61.12694	60.02036	51.54548	51.96516	53.79151	54.58906	51.93943	52.30021	60.23899	53.88294
Switzerland	56.54679	59.30062	65.35952	74.57223	72.08317	77.11713	91.25403	86.54767	88.10949	89.68471	84.77614	83.07328	83.35209	86.38840	85.33452	87.10041	93.45744	80.23868
Turkey	7.45630	8.10186	9.79188	10.94117	10.10347	10.74277	11.42056	11.79563	12.61478	12.15799	11.00628	10.89460	10.58967	9.45435	9.12152	8.53643	9.58661	10.19505
Ukraine	1.89447	2.39132	3.19793	4.06655	2.63939	3.07843	3.70482	4.00480	4.18774	3.10464	2.12466	2.18773	2.63833	3.09656	3.66146	3.75174	4.83557	3.20977
United Kingdom	42.13209	44.65410	50.65326	47.54935	38.95221	39.68861	42.28488	42.68680	43.71381	47.78724	45.40457	41.49956	40.85776	43.64695	43.07050	41.09808	47.33436	43.70671

Source: World Bank (2022). █: Data Not available. Data Source: World Development Indicators. Source URL: <http://data.worldbank.org/indicator/NY.GDP.PCAP.CD> (World Bank, 2022b). Last Updated Date: 16/9/2022. Indicator Code: NY.GDP.PCAP.CD. SOURCE NOTE: GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.