



# Changes on economic freedom in 11 post-socialist countries of Central-Eastern and South-Eastern Europe in 1996–2022

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## Abstract

**Motivation:** One of the most important dimensions of socio-economic development in democratic countries with market economies remains economic freedom. In this context, it is worth assessing the evolution of economic freedom in 11 countries of Central and Eastern Europe and South-Eastern Europe: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia, Slovakia during the period of institutional transformations in 1996–2022.

**Aim:** The aim of the article is to present the results on correlation,  $\sigma$ -convergence and  $\sigma$ -divergence, as well as a multidimensional comparative analysis in the field of economic freedom. In order to conduct comparative analyzes, the economic freedom indexes published by The Heritage Foundation in Washington and Wall Street Journal will be used. They measure 12 quantitative and qualitative aspects grouped around the four pillars of economic freedom: Rule of Law — property rights, government integrity, judicial



effectiveness; Government Size — government spending, tax burden, fiscal health; Efficiency regulators — business freedom, labour freedom, monetary freedom; Open Markets — trade freedom, investment freedom, financial freedom.

**Results:** The obtained results allow us to assess the generally positive changes in economic freedom in its 12 partial and 1 general aspects in relation to each country separately, as well as in relation to the group of countries that joined the European Union after 2003. They are a significant supplement to the knowledge about creating economic freedom in 11 post-socialist countries in the years 1996–2022.

*Keywords:* economic freedom;  $\sigma$ -convergence;  $\sigma$ -divergence analysis; multidimensional comparative analysis; clusters, dendrograms

*JEL:* O57; P20; P29; P52

## 1. Introduction

Until the end of the 1980s, many countries of Southeast Europe and Central and Eastern Europe remained within the sphere of influence of the USSR. In turn, in the 1990s, these countries became an area of profound systemic changes: political, institutional, economic and social. The subject of our interest will be, in particular, Bulgaria (2004, 2007, –, –)<sup>1</sup>, Croatia (2009, 2013, –, –), Czech Republic (1999, 2004, 2007, –), Estonia (2004, 2004, 2010, 2011), Hungary (1999, 2004, 1996, –), Lithuania (2004, 2004, 2018, 2015), Latvia (2004, 2004, 2016, 2014), Poland (1999, 2004, 1995, –), Romania (2004, 2007, –, –), Slovakia (2004, 2004, 2000, 2009) and Slovenia (2004, 2004, 2010, 2007), which having met the accession criteria after 2003, joined the European Union.

The fact that the members of the above-mentioned communities were accepted for the accession of post-socialist countries to them is an indirect proof of recognition of international communities for their reform achievements, in the field of marketization of economies, the creation of new institutions conducive to democratization and the implementation of the fundamental values of the West Atlantic civilization, which were in the nature of deep structural changes. As one can see, the integration processes of these countries with developed countries have not been completed with full success: Bulgaria, Croatia and Romania are not members of the OECD, and Bulgaria, Croatia, Czech Republic, Hungary, Poland and Romania remain outside the euro zone.

One of the more interesting perspectives for assessing the intensity and effects of socio-economic changes taking place in post-socialist countries is economic freedom. In 1995, the Heritage Foundation and Wall Street Journal created the Index of Economic Freedom to measure the degree of economic

<sup>1</sup> The dates in which these countries joined NATO, EU, OECD, and euro zone are given in brackets. In the context of the contemporary war between Russia and Ukraine, the accession of the 11 countries to NATO proved to be a particularly significant achievement for these countries from the point of view of the transition from centrally planned economies to the market economy, the democratization of political and legal institutions, the assurance of economic freedom and above all, the real exit from the sphere of influence of Russia.

freedom in the world's nations. The creators of the index claim to take an approach inspired by that of Adam Smith in the *Wealth of Nations* that “basic institutions that protect the liberty of individuals to pursue their own economic interests result in greater prosperity for the larger society”.

The Heritage Foundation (2022) website states that “Economic freedom is the fundamental right of every human to control his or her own labour and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please. In economically free societies, governments allow labour, capital, and goods to move freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself”.

The authors of the freedom index distinguish four categories of freedom: rule of law, government size, regulatory efficiency and regulatory efficiency. Each of them corresponds to three partial indices of freedom: property right, judicial effectiveness, government integrity, tax burden, government spending, fiscal health, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom. Each of them has been assigned specific sub-categories (see Table 1).

The index scores nations on 12 aspects of economic freedom, using statistics from organizations like the World Bank, the International Monetary Fund, Economist Intelligence Unit and Transparency International.

The ranking scores aspects of economic freedom between 0 and 100, with 0 meaning “no economic freedom” and 100 meaning “total economic freedom”. The overall index of freedom is the unweighted arithmetic mean of the partial indexes of freedom.

Based on the overall index or partials index of economic freedom, the following country classification can be made: 100.0–80.0 (free), 79.9–70.0 (mostly free), 69.9–60.0 (moderately free), 59, 9–50.0 (mostly unfree), 49.9–0.0 (repressed).

This article refers to a series of important works on socio-economic transformations in Europe: (Bohle & Greskovits, 2012; Farkas 2011; Ichimura et al., 2009; Iwasaki, 2020; Kondratowicz, 2013; Kowalski, 2013; Lane & Myant, 2007; Piątkowski, 2013; Rapacki, 2019; Sachs, 2011; Tridico, 2006). It is also a development of the following publications: (Gorynia & Malaga, 2020; Lach & Malaga, 2022; Malaga, 2018a; 2018b).

The structure of the article is as follows. In point 2 we present the basic symbols and definitions. In point 3 we discuss the applied methods of  $\sigma$ -convergence and  $\sigma$ -divergence analysis and multivariate comparative analysis. In point 4 we present the results of empirical research for 11 countries in the period 1995–2022 obtained on the basis of the methods discussed in point 3 separately for the overall index of economic freedom and for 12 partial indices of economic freedom. In point 5 we present final conclusions and we formulate postulates for further research.

## 2. Basic symbols and definitions

$j=1, 2, \dots, 11$  — countries (Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia, Slovenia and Romania);

$t=1, 2, \dots, 27$  — years 1996, 1997, ..., 2022;

$k=1, 2, \dots, 12$  — aspects of freedom or partials index of freedom (property right<sup>2</sup>, judicial effectiveness<sup>3</sup>, government integrity<sup>4</sup>, tax burden<sup>5</sup>, government spending<sup>6</sup>, fiscal health<sup>7</sup>, business freedom<sup>8</sup>, labour freedom<sup>9</sup>, monetary freedom<sup>10</sup>, trade freedom<sup>11</sup>, investment freedom<sup>12</sup>, financial freedom<sup>13</sup>).

**Df.1.** The partial index of economic freedom  $k=1, 2, \dots, 12$ , in the country  $j=1, 2, \dots, 11$ , in the year  $t=1, 2, \dots, 27$  is called the coefficient:

$$IT_t^{kj} \in [0,100]. \quad (1)$$

**Df.2.** The overall index of economic freedom in the country  $j=1, 2, \dots, 11$ , in the year  $t=1, 2, \dots, 27$  is called the coefficient:

$$IT_t^j = \frac{1}{12} \sum_{k=1}^{12} IT_t^{kj} \in [0,100]. \quad (2)$$

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<sup>2</sup> Degree of a country's legal protection of private property rights and degree of enforcement of those laws.

<sup>3</sup> Degree of the judiciary's efficiency and fairness, especially dealing with property laws.

<sup>4</sup> How prevalent are forms of political corruption and practices such as bribery, extortion, nepotism, cronyism, patronage, embezzlement and graft.

<sup>5</sup> Marginal tax rates on personal and corporate income and the overall taxation level (including direct and indirect taxes imposed by all levels of government) as a percentage of the GDP.

<sup>6</sup> The burden of government expenditures, including consumption by the state and all transfer payments related to various welfare programs.

<sup>7</sup> How well a country manages its budget by quantifying the growing debt and deficit.

<sup>8</sup> The cost, time and freedom to open, operate and close a business, taking into consideration factors like electricity.

<sup>9</sup> The intrusiveness of labour rights such as minimum wage, laws inhibiting layoffs, severance requirements, and measurable regulatory restraints on hiring and hours worked, plus the labour force participation rate as an indicative measure of employment opportunities in the labour market.

<sup>10</sup> How stable are prices and how much microeconomy intervenes.

<sup>11</sup> The extent to which tariff and nontariff barriers affect imports and exports of goods and services into and out of the country.

<sup>12</sup> How free or constrained is the flow of investment capital of individuals and firms.

<sup>13</sup> Indicates banking efficiency as well as how independent the government is from the financial sector.



**Df.3.** The  $\sigma$ -convergence indicator in the group of countries  $j=1, 2, \dots, 11$ , due to the partial index of economic freedom  $k=1, 2, \dots, 12$ , in the year  $t=1, 2, \dots, 27$  is called the coefficient:

$$\sigma_t^k = \sqrt{\sum_{j=1}^{11} (IT_t^{kj} - \overline{IT}_t^{kj})^2}, \text{ where } \overline{IT}_t^{kj} = \frac{\sum_{j=1}^{11} IT_t^{kj}}{11}, \text{ if } \forall t^1 > t, \sigma_t^k < \sigma_t^k. \quad (3)$$

**Df.4.** The  $\sigma$ -divergence indicator in the group of countries  $j=1, 2, \dots, 11$ , due to the partial index of economic freedom  $k=1, 2, \dots, 12$ , in the year  $t=1, 2, \dots, 27$  we call the indicator:

$$\sigma_t^k = \sqrt{\sum_{j=1}^{11} (IT_t^{kj} - \overline{IT}_t^{kj})^2}, \text{ where } \overline{IT}_t^{kj} = \frac{\sum_{j=1}^{11} IT_t^{kj}}{11}, \text{ if } \forall t^1 > t, \sigma_t^k > \sigma_t^k. \quad (4)$$

**Df.5.** The  $\sigma$ -convergence indicator in the group of countries  $j=1, 2, \dots, 11$ , due to the overall index of economic freedom, in the year  $t=1, 2, \dots, 27$  is called the coefficient:

$$\sigma_t = \sqrt{\sum_{j=1}^{11} (IT_t^j - \overline{IT}_t)^2}, \text{ where } \overline{IT}_t = \frac{\sum_{j=1}^{11} IT_t^j}{11}, \text{ if } \forall t^1 > t, \sigma_t^k < \sigma_t. \quad (5)$$

**Df.6.** The  $\sigma$ -divergence indicator in the group of countries  $j=1, 2, \dots, 11$ , due to the overall index of economic freedom, in the year  $t=1, 2, \dots, 27$  is called the coefficient:

$$\sigma_t = \sqrt{\sum_{j=1}^{11} (IT_t^j - \overline{IT}_t)^2}, \text{ where } \overline{IT}_t = \frac{\sum_{j=1}^{11} IT_t^j}{11}, \text{ if } \forall t^1 > t, \sigma_t^k > \sigma_t. \quad (6)$$

Table 1 explains the relationships between the categories, aspects or partial indices of freedom and sub-factors of economic freedom in terms of determining partial values and the overall index of economic freedom.

### 3. Description of the applied methods of multivariate comparative analysis

In the empirical research of the impact of institutional changes on economic freedom in 11 post-socialist countries of Central-Eastern and South Eastern Europe in 1996–2022, a cluster analysis was carried out, which is one of the traditional tools of multivariate comparative analysis (Panek & Zwierzchowski, 2013). It was used to identify groups of countries that were found to be similar and called clusters.

The clustering procedure was performed using the hierarchical method. This method assumes that initially all clustered countries are single-element clusters, and their clustering is done in stages according to the previously determined

distance matrix between countries. In the following steps of the procedure, the objects are combined into clusters. The order in which the countries are joined depends on the measure of similarity adopted. The grouping in clusters is carried out until obtaining a large group to which belong all the objects subjected to the study. This is called agglomeration procedure (Panek & Zwierzchowski, 2013). In empirical studies, the group mean method has been used to link other countries. The joins of countries and clusters in the following steps of the procedure are represented by a tree of links, also called a dendrogram.

The cluster analysis was carried out separately for the twelve partials indicators of economic freedom and finally for overall index of economic freedom separately for the eleven analysed countries. The country similarity matrices determined for this purpose presented the distances between the time series of transformation indices, for which distance measures determined on the basis of the Dynamic Time Warping (DTW) algorithm were used (Giorgino, 2009). The purpose of using the DTW algorithm was to find the smallest possible distance between two time series of transformation indices, taking into account any time lags in these series. The distance between countries, constructed on the basis of the DTW algorithm, makes it possible to better appreciate the similarity of the evolution (shape) of the time series of the transformation indices than the Euclidean distance. This algorithm also works well in the case of series of similar structure, but shifted in time, or with amplitudes different from the assumed values. The DTW distance can also be determined for series of different lengths. In the empirical research, the R program and the *dtw* and *dtwclust* packages were used for cluster analysis.

## 4. Empirical results

### 4.1. Overall indices of economic freedom in 11 countries in 1996–2022

Table 2 presents the values of overall indices of economic freedom and the resulting rankings for 11 post-socialist countries in 1996, 2005, 2014 and 2022.

In all countries, except Hungary, there was an increase in the overall indices of freedom. The growing values of the overall indices of freedom should be assessed as a positive effect of the application and, consequently, membership of NATO and the European Union. Increases in the value of this indicator determined the changing rankings of individual countries in the group of 11 analysed countries.

It is worth noting that in 1996 Bulgaria, Croatia, Lithuania and Romania belonged to the repressed country category. Hungary, Latvia, Poland, Slovakia and Slovenia were among the mostly unfree countries. On the other hand, the Czech Republic and Estonia were moderately free countries. After 27 years, in 2022, Estonia became the only country rated as free. Bulgaria, Czech Repub-

lic, Latvia, Lithuania and Slovenia were ranked among mostly free countries. On the other hand, the other countries: Croatia, Hungary, Poland, Slovakia and Romania are classified as moderately free.

From the point of view of rankings compiled within 11 countries, Estonia, Lithuania, Latvia and Bulgaria have made the most progress. The Czech Republic remained in the group of countries with the highest average economic freedom, but fell from the leading position to 4th place. Poland, Slovakia and Hungary recorded a significant decline. On the other hand, Romania and Croatia, despite a significant increase in the average level of economic freedom in 1996–2022, remained among the outsiders of this group. Hungary was the only country to record a decrease in the overall indices of freedom in 2022 compared to 2014. Which translated into the assumption of the role of an outsider in this group in 2022.

Aside from the observed trends, it is worth noting that while in the initial period of institutional changes in the analysed countries, economic freedom in all countries, except the Czech Republic and Estonia, was highly unsatisfactory, from the point of view of the given rankings, Poland, Slovakia and Hungary belonged to the group of leaders. Between 1996 and 2022, the deepest institutional changes took place in Estonia, Lithuania, Latvia and Slovenia. This is evidenced by the admission of these countries to NATO, OECD and the euro area. In particular, the first three of these countries turned out to be the most determined in leaving Russia's sphere of influence and in democratizing, marketizing and improving the level and quality of economic freedom.

Table 3 presents the values of the Pearson simple correlation coefficients, calculated on the basis of the overall indices of economic freedom time series for all pairs of the analysed countries in the years 1996–2022.

The values of the correlation coefficients between the overall indices of freedom time series confirm the conclusion about the increasing average economic freedom in 11 post-socialist countries in the years 1996–2022. In all cases, the correlation is positive and relatively high. Against this background, the relatively low correlation obtained in 1996–2022 for the Czech Republic and Slovakia, which until 1992 comprised one country, Czechoslovakia, is surprising.

Taking the ranking of countries according to the overall indices of freedom values in 2022 as the basis for the analysis, it is worth noting a high correlation between Estonia and Lithuania and a positive and relatively weak correlation between Estonia and Czech Republic. Lithuania was strongly correlated with Bulgaria, Latvia and Hungary. Latvia is strongly correlated with Bulgaria and Lithuania. Czech Republic is the most strongly correlated with Poland. Bulgaria is the most closely associated with Lithuania, Romania, Croatia, Hungary and Latvia. Slovenia is strongly correlated with Croatia. Slovakia has the strongest correlation with Bulgaria, and the weakest with Czech Republic and Poland. Poland is most strongly correlated with Croatia and Czech Republic, and the weakest with Slovakia. Croatia is most closely associated with Romania, Poland, Bulgaria and Slovenia. Romania is most closely associated with

Croatia and Bulgaria. Finally, Hungary has the strongest correlation with Czech Republic and Bulgaria.

#### 4.2. Partial indices of economic freedom in 11 countries in 1996, 2005, 2014 and 2022

Table 4 shows the values of partial indices of freedom in all analysed countries in 1996, 2005, 2014 and 2022.

In the case of the PII (property right) index, it was observed that in 1996 the Czech Republic, Estonia, Hungary and Poland belonged to the group of mostly free countries. Croatia, Lithuania, Latvia, Slovakia and Bulgaria were mostly unfree countries, while Slovenia and Romania were repressed countries. After 27 years, Estonia, Czech Republic, Lithuania, Latvia, Slovenia, Slovakia and Romania joined freed countries. Bulgaria, Hungary and Poland (as an outsider), in turn, remained in the group of mostly free countries. The most spectacular changes in this respect occurred in Estonia, Slovenia, Croatia and Romania.

Data on PI2 (judicial effectiveness) refer to the period 2017–2022. In the initial year, Estonia was the only free country and Lithuania was moderately free. Countries such as Czech Republic, Croatia, Latvia, Poland, Hungary, Slovenia and Romania were mostly unfree countries, while Slovakia and Bulgaria were repressed countries. In 2022, Estonia, Slovenia and Bulgaria were free countries. Latvia, Lithuania and Slovakia were mostly free countries. Croatia, Hungary and Romania have become moderately free countries, while Poland has been recognized as mostly unfree country. The case of Poland is particularly painful, as in 2019–2021 it was among unfree countries. And the level of judicial effectiveness in 2022 was lower than in 2017.

In the case of PI3 (government integrity) in 1996, Croatia, Lithuania, Slovenia, Bulgaria and Romania were considered unfree countries. Czech Republic, Estonia, Croatia, Hungary, Latvia and Slovakia were considered mostly unfree countries, and only Poland (leader) was considered mostly free country. In 2022, Estonia joined free countries. Lithuania, Latvia, Poland and Slovenia were considered moderately free countries. In turn, Czech Republic, Croatia and Slovakia were considered unfree countries, while Hungary, Bulgaria and Romania were considered unfree countries. It is worth noting the progress of Estonia and the regression of Poland.

With regard to PI4 (tax burden), it is worth noting that in 1996 Czech Republic, Poland and Romania were recognized as unfree countries. Hungary and Bulgaria were considered mostly unfree countries, while Slovenia and Slovakia were considered moderately free countries. Finally, Latvia, Croatia, Lithuania and Estonia were classified as mostly free countries. In 2022, the group of free countries included Romania, Bulgaria, Lithuania, Croatia, Hungary and Estonia. Czech Republic, Latvia, Slovenia and Poland were among the mostly free countries, and Slovenia is in the Most unfree group. Romania and Bulgaria



recorded the most spectacular progress in 1996–2022, while Slovenia experienced the greatest regression.

In the case of PI5 (government spending) in 1996, Lithuania and Romania were moderately free. Estonia, Latvia and Croatia were considered mostly unfree countries, and Hungary, Slovakia, Poland, Czech Republic, Slovenia and Bulgaria were repressed countries. In 2022, Romania and Bulgaria were assigned to the moderately free countries group, and Lithuania and Latvia to the mostly unfree countries group. Finally, Croatia, Hungary, Slovenia, Poland and Slovakia were considered to be repressed countries. The PI5 index revealed the lowest advancement among the criteria of economic freedom.

With regard to PI6 (fiscal health), Estonia, Czech Republic, Latvia, Lithuania and Bulgaria retained the status of free countries in 2017–2022. Poland has retained the status of a moderately free country. Slovenia and Croatia from the group of repressed countries moved to the group of moderately free countries. Hungary with moderately free country has become mostly unfree country. Slovenia lost its free country status to moderately free country, and Romania turned from free country to repressed country.

The analysis of changes in the value of PI7 (business freedom) in the years 1996–2022 allows for the formulation of the following conclusions. In 1996, Bulgaria, Croatia and Romania belonged to the mostly free countries. Hungary, Lithuania, Poland, Slovakia and Slovenia were mostly free countries. By contrast, Czech Republic and Estonia were free countries. In 2022, Lithuania, Estonia, Latvia and Czech Republic belonged to the free countries group. On the other hand, other countries such as Croatia, Hungary, Poland, Slovenia, Slovakia, Bulgaria and Romania belong to the group of mostly free countries. In the entire period of 1996–2022, quite strong changes affected the Czech Republic, which in the beginning year turned from free country to mostly free country, and it regained the status of free country only in 2022.

In the case of PI8 (labour freedom), the available statistical data relate to the period 2005–2022. In 2005, Bulgaria was a free country and Slovakia was mostly free country. Hungary, Latvia and Poland, on the other hand, belonged to moderately free countries. Czech Republic, Lithuania and Romania were mostly unfree countries, Slovenia and Croatia were repressed countries. In 2022, only two groups of moderately free countries (Bulgaria, Romania, Slovenia, Latvia, Hungary, Estonia) and mostly unfree countries (Lithuania, Croatia, Poland, Czech Republic and Slovakia) are distinguished.

In the case of the PI9 index (monetary freedom), quite radical changes took place in the years 1996–2022. In 1996, the most numerous group were countries such as Croatia, Lithuania, Estonia, Latvia, Romania and Bulgaria, which were considered repressed countries. Poland belonged to mostly unfree countries. Hungary, Slovakia and Slovenia, on the other hand, belonged to moderately free countries, and Czech Republic had the status of mostly free country. In 2022, as a result of significant progress, only free countries (Slovenia, Bulgaria, Latvia, Lithuania, Estonia and Croatia) and mostly free countries (Poland,

Czech Republic, Romania and Slovakia) are distinguished. Each of the countries belonging to the second group in some years achieved and then lost the status of free country.

Based on the analysis of the variability of the PII0 (trade freedom) index, it appears that in 1996 Poland, Hungary, Latvia and Slovenia belonged to mostly unfree countries. Romania, Lithuania and Croatia were moderately free countries, while Czech Republic, Estonia, Slovakia and Bulgaria were mostly free countries. After 27 years, all countries were included in the Mostly Free Countries group. Which was related to the deterioration of their position, because before that, each of them had the status of free country.

In the case of the PIII (investment freedom) index in 1996, Slovenia was the only repressed country. Croatia, Lithuania and Latvia belonged to mostly unfree countries. Czech Republic, Hungary, Poland, Slovakia, Bulgaria and Romania were among the mostly free countries, and Estonia was the only free country that retained this status throughout the 1996–2022 period. In 2022, the group of free countries expanded to Latvia, Poland and Hungary. Croatia, Slovakia, Czech Republic, Lithuania and Romania make up the mostly free countries group, and only Bulgaria is ranked among the mostly free countries.

As for the PII2 (financial freedom) index in the years 1996–2022, the values of this index were relatively stable. Throughout the entire period, the Czech Republic belonged to the free countries. Estonia and Hungary remained in the mostly free group, although Estonia had the status of free country in 2002–2018, while Slovenia, from mostly free country in 1996, passed through the group of mostly unfree countries in 2022. Poland and Slovakia joined the group of mostly free countries from the group of unfree countries. Bulgaria, Croatia and Latvia, which in 1996 were among the mostly unfree countries in 2022, were among the moderately free countries. Lithuania has turned from repressed country to mostly free country, while Romania was included in the mostly unfree country group throughout the analysed period. However, in 2001 it was considered repressed country. The presented changes are the result of the interaction of at least two factors. The first is the impact of external regulations on economic freedom resulting from membership in NATO, the EU, OECD and the euro area. The second is the policy of the governments of individual countries. While the first factor should have a similar impact on individual countries, the second should be the subject of detailed analyses and assessments of the activities of successive governments or those political parties that at certain times exercised real power in these countries.

#### 4.3. $\sigma$ -convergence and $\sigma$ -divergence for overall index of economic freedom

Chart 1 shows the values of the coefficients of the average variability of the overall index of economic freedom in the group of analysed countries in 1996–2022. It is not difficult to notice that the  $\sigma$ -convergence effect was revealed in 1999–

2000, 2001–2003, 2004–2006, 2007–2012, 2017–2019 and 2020–2022. The  $\sigma$ -divergence effect was noted in the remaining subperiods.

It is worth noting that the general trend of changes in the overall index of economic freedom was dominated by  $\sigma$ -convergence over  $\sigma$ -divergence. There was no stagnation in the entire analysed period. This means that the marked increase in the absolute values of the overall index of economic freedom in individual countries was accompanied by an increase in the homogeneity of the group of countries in the  $\sigma$ -convergence periods. However, in the periods of  $\sigma$ -divergence, the heterogeneity of the entire group of countries increased.

It is worth emphasizing that as a result of institutional changes related to membership in NATO, the EU and, in the case of some countries, also in the OECD and the euro zone, as well as the policy pursued in individual countries aimed at improving the state of economic freedom, the group of countries under consideration became more homogeneous in 2022 compared to the situation in 1996.

#### 4.4. $\sigma$ -convergence and $\sigma$ -divergence for partial indices of economic freedom

Chart 2 illustrates the effects of  $\sigma$ -convergence,  $\sigma$ -divergence and stagnation in relation to the absolute values of the twelve partial indicators of economic freedom. In the case of 9 indexes, the results were related to the period 1996–2022, for judicial effectiveness and fiscal health for the period 2017–2022, and for labour freedom for the period 2004–2022.

Let the reader identify the subperiods of  $\sigma$ -convergence,  $\sigma$ -divergence or stagnation in relation to particular partial indicators of economic freedom. Instead, let us focus our attention on observable trends.

In the case of property rights, tax burden, government spending, business freedom, labour freedom, monetary freedom, investment freedom and financial freedom, we can talk about the advantage of  $\sigma$ -convergence. With regard to judicial effectiveness and fiscal health, the advantage of  $\sigma$ -divergence is clear. On the other hand, for trade freedom it is not difficult to notice the stagnation in the period 2008–2022.

#### 4.5. Cluster analysis for overall index of freedom in the period 1996–2022

Chart 3 is a dendrogram obtained for 11 countries described by the overall index of economic freedom in the period 1996–2022<sup>14</sup>.

The comparison of the obtained results with the data in Table 2 confirms the conclusions that in the entire period 1996–2022 the lowest level of the overall index of economic freedom was in Croatia, Bulgaria and Romania, the aver-

<sup>14</sup> As not all time series were of the same length, the DTW algorithm was used to compute the distance matrix.



age one was for Poland, Slovenia, Hungary and Slovakia, and the highest was in Latvia. Lithuania, Czech Republic and Estonia as a leader.

#### 4.6. Cluster analysis: partial indices of economic freedom in the period 1996–2022

With regard to partials indices of economic freedom, the results were not presented in the form of dendrograms. Instead, a collective Table 5 was prepared, which provides the affiliation of individual countries to one of the three distinguished clusters.

When analysing the obtained results, it is worth paying special attention to those countries that differ significantly from the others and, consequently, form one-element clusters. In the case of PI2 — judicial effectiveness, Estonia was a clear leader throughout the period. Due to PI4 — the tax burden, Slovenia was the clear outsider. Similarly, Hungary and Romania remained strong outsiders, appropriate due to PI5 — government spending and PI6 — fiscal health. On the other hand, in the case of PI11, Estonia remained the undisputed leader.

#### 4.7. Cluster analysis: synthesis

Table 6 lists all possible pairs of the analysed countries and indicates the overall and partial indices of economic freedom due to which these pairs were in the same clusters in 1996–2022.

Using Chart 4, the overall number of similarity relations between pairs of countries was visualized due to belonging to the same clusters created for the overall index and 12 partial indices of economic freedom for a predetermined number of 3 clusters.

It is worth noting that in the years 1996–2022 the very strong similarity between Latvia and Lithuania and between the countries of the Visegrad group: Poland, Czech Republic, Hungary and Slovakia deserves special attention. On the other extreme, of the countries with the rarest similarity to other countries were Bulgaria, Romania, Estonia and Slovenia.

On the basis of Chart 4, it can be concluded that the total number of similarity relations for individual countries, expressed as belonging to the same clusters, was as follows: Bulgaria — 32, Croatia — 60, Czech Republic — 59, Estonia — 40, Hungary — 60, Latvia — 61, Lithuania — 60, Poland — 62, Slovakia — 49, Slovenia — 49 and Romania — 38.

It is worth emphasizing the extremely different position of the two countries, Poland and Estonia, which stand out in this aspect. Poland, as an average country, was included in the same clusters as many as 62 times, and Bulgaria only 32 times.

## 5. Final conclusions and proposed extensions

The conducted research allows for a fairly reliable and comprehensive assessment of changes in the overall and partial indices of economic freedom in relation to individual countries and within a heterogeneous group of countries. On their basis, it is possible to identify similarities and differences between the studied countries. Moreover, an attempt can be made to reliably assess the impact of the economic policies of individual countries on the increase in the scope of economic freedom in terms of overall and partial indices of economic freedom.

The adopted research methods make it impossible to determine which institutional changes lead to regression and which to the development of economic freedom in the studied countries. A reliable assessment of changes in economic freedom in the analysed countries requires the use of econometric models with the help of which one could assess the development of economic freedom in connection with economic growth, socio-economic development, increase in welfare, implementation of technological progress, innovation, improvement of resources and quality of both human and social capital in these countries. Only the extended research carried out in the above-mentioned manner could constitute the basis for assessing the role of these countries in the European Union and the euro area.

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## Appendix

**Table 1.**  
**Index of Economic Freedom 2022: categories, aspects and sub-factors**

Categories	Aspects of freedom or partials index	Sub-factors
rule of law	property rights	physical property rights
		intellectual property rights
		strength of investor protection
		risk of expropriation
		quality of land administration
		judicial effectiveness
	judicial effectiveness	judicial independence
		quality of the judicial process
		likelihood of obtaining favourable judicial decisions
	government integrity	likelihood of obtaining death threats could be lower
		public trust in politicians
		irregular payments and bribes
transparency of government policymaking		
absence of corruption		
perceptions of corruption		
government size	tax burden	top marginal tax rate on individual income
		top marginal tax rate on corporate income
		total tax burden as a percentage of GDP
	government spending	average deficits as a percentage of GDP for the most recent three years (80% of score)
	fiscal health	debt as a percentage of GDP (20% of score)
regulatory efficiency	business freedom	starting a business — procedures (number)
		starting a business — time (days)
		starting a business — cost (% of income per capita)
		starting a business — minimum capital (% of income per capita)
		obtaining a license — procedures (number)
		obtaining a license — time (days)
		obtaining a license — cost (% of income per capita)
		closing a business — time (years)
		closing a business — cost (% of estate)
		closing a business — recovery rate (cents on the dollar)
		getting electricity — procedures (number)
		getting electricity — time (days)
		getting electricity — cost (% of income per capita)
	ratio of minimum wage to the average value added per worker	
	labour freedom	hindrance to hiring additional workers
		rigidity of hours
		difficulty of firing redundant employees
		legally mandated notice period
		mandatory severance pay
labour force participation rate		



Categories	Aspects of freedom or partials index	Sub-factors
market openness	monetary freedom	weighted average inflation rate for the most recent 3 years price controls
	trade freedom	trade-weighted average tariff rate nontariff barriers (NTBs)
	investment freedom	extent of government regulation of financial services
	financial freedom	degree of state intervention in banks and other financial firms through direct and indirect ownership government influence on the allocation of credit extent of financial and capital market development
		openness to foreign competition

Source: The Heritage Foundation (2022).

**Table 2.**  
Values and rankings of the analysed countries due to the overall index of economic freedom in 1996, 2005, 2014 and 2022

Countries	1996		2005		2014		2022	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
Bulgaria	48.6	9	62.3	7	67.8	8	71.0	5
Croatia	48.0	10	51.9	11	60.4	11	67.6	9
Czech Republic	68.1	1	64.6	5	72.2	3	74.4	4
Estonia	65.4	2	75.2	1	75.9	1	80.0	1
Hungary	56.8	5	63.5	6	67.0	5	66.9	11
Latvia	55.0	6	66.3	4	68.7	4	74.8	3
Lithuania	49.7	8	70.5	2	73.0	2	75.8	2
Poland	57.8	3	59.6	9	67.0	5	68.7	8
Slovakia	57.6	4	66.8	3	66.4	7	69.7	7
Slovenia	50.4	7	59.6	8	62.7	10	70.5	6
Romania	46.2	11	52.1	10	65.5	9	67.1	10

Source: The Heritage Foundation (2022).





**Table 3.**  
Correlation matrix of all pairs of countries in 1996–2022 in terms of overall index of economic freedom

	BUL	CRO	CZR	EST	HUN	LAT	LIT	POL	SLK	SLV	ROM
BUL	1.00	0.82	0.56	0.72	0.81	0.80	0.91	0.74	0.87	0.67	0.86
CRO	0.82	1.00	0.79	0.57	0.73	0.75	0.79	0.86	0.62	0.81	0.89
CZR	0.56	0.79	1.00	0.38	0.43	0.68	0.52	0.85	0.24	0.63	0.78
EST	0.72	0.57	0.38	1.00	0.70	0.61	0.87	0.59	0.58	0.61	0.56
HUN	0.81	0.73	0.43	0.70	1.00	0.68	0.84	0.65	0.73	0.63	0.71
LAT	0.80	0.75	0.68	0.61	0.68	1.00	0.90	0.76	0.56	0.72	0.77
LIT	0.91	0.79	0.52	0.87	0.84	0.90	1.00	0.72	0.76	0.71	0.79
POL	0.74	0.86	0.85	0.59	0.65	0.76	0.72	1.00	0.40	0.63	0.78
SLK	0.87	0.62	0.24	0.58	0.73	0.56	0.76	0.40	1.00	0.54	0.72
SLV	0.67	0.81	0.63	0.61	0.63	0.72	0.71	0.63	0.54	1.00	0.54
ROM	0.86	0.89	0.78	0.56	0.71	0.77	0.79	0.78	0.72	0.54	1.00

Source: Own calculations.

**Table 4.**  
Values of partial indices of economic freedom of the analysed countries in 1996, 2005, 2014 and 2022

PI	BUL	CRO	CZR	EST	HUN	LAT	LIT	POL	SLK	SLV	ROM
1996											
PI1	50.0	50.0	70	70.0	70.0	50.0	50	70	50.0	30.0	30.0
PI2	–	–	–	–	–	–	–	–	–	–	–
PI3	30.0	30.0	50.0	50.0	50.0	50.0	30.0	70.0	50.0	30.0	30.0
PI4	50.6	77.4	47.5	73.2	55.8	78.0	76.6	48.0	66.4	69.3	42.4
PI5	30.6	50.5	38.2	59.2	–	50.8	62.4	32.6	22	34.6	64.9
PI6	–	–	–	–	–	–	–	–	–	–	–
PI7	55.0	55.0	100.0	85.0	70.0	70.0	70.0	70.0	70.0	70.0	55.0
PI8	–	–	–	–	–	–	–	–	–	–	–
PI9	30.0	–	72.5	17.3	66.6	41.1	12.9	52.4	65.1	60.5	11.9
PI10	73.0	69.0	75.0	74.0	59.0	55.0	65.0	57.0	75.0	59.0	74.0
PI11	70.0	50.0	70.0	90.0	70.0	50.0	50.0	70.0	70.0	70.0	70.0
PI12	50.0	50.0	90.0	70.0	70.0	50.0	30.0	50.0	50.0	70.0	50.0
2005											
PI1	30.0	30.0	70.0	70.0	70.0	50.0	50.0	50.0	50.0	50.0	30.0
PI2	–	–	–	–	–	–	–	–	–	–	–
PI3	39.0	37.0	39.0	55.0	48.0	38.0	47.0	36.0	37.0	59.0	28.0
PI4	80.3	59.3	68.2	82.9	67.9	83.6	82.8	68.3	81.9	55.6	70.1
PI5	53.4	26.2	15.1	61.6	25.6	52.7	65.1	30.3	42.4	45.3	68.9
PI6	–	–	–	–	–	–	–	–	–	–	–
PI7	55.0	55.0	70.0	85.0	70.0	70.0	70.0	70.0	78.0	85.0	55.0
PI8	80.3	44.3	57.7	47.4	68.2	63.5	55.8	60.0	75.7	40.3	55.5
PI9	83.1	81.4	88.9	85.5	75.6	84.8	90.1	82.3	78.0	79.1	62.6
PI10	82.0	65.4	76.8	84.8	70.0	80.0	84.0	79.2	72.8	81.8	70.4
PI11	50.0	50.0	70.0	90.0	70.0	70.0	70.0	50.0	70.0	50.0	30.0
PI12	50.0	70.0	90.0	90.0	70.0	70.0	90.0	70.0	90.0	50.0	50.0



PI	BUL	CRO	CZR	EST	HUN	LAT	LIT	POL	SLK	SLV	ROM
2014											
PI1	30.0	40.0	70.0	90.0	60.0	50.0	60.0	50.0	50.0	60.0	40.0
PI2	–	–	–	–	–	–	–	–	–	–	–
PI3	35.2	41.1	45.3	64.2	48.6	43.6	49.9	54.8	41.8	61.0	37.7
PI4	91.2	69.4	81.7	80.4	81.1	84.6	92.9	76.1	80.2	58.9	87.0
PI5	64.5	45.8	43.8	56.0	26.8	54.9	55.9	43.2	56.0	22.6	59.2
PI6	–	–	–	–	–	–	–	–	–	–	–
PI7	73.5	61.4	70.1	77.6	79.3	82.5	85.7	70.1	67.0	85.4	71.0
PI8	80.2	39.3	84	55.9	65.7	68.5	59.0	60.4	53.6	51.0	65.2
PI9	79.6	79.2	79.4	76.9	75.6	79.7	78.6	77.8	78.1	80.3	77.1
PI10	87.8	87.4	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8
PI11	55.0	80.0	80.0	90.0	75.0	85.0	80.0	70.0	80.0	70.0	80.0
PI12	60.0	60.0	80.0	80.0	70.0	50.0	80.0	70.0	70.0	50.0	50.0
2022											
PI1	77.3	81.1	88.8	91.5	75.8	88.5	88.6	72.3	83.2	89.7	81.1
PI2	61.1	69.9	81.8	92.3	62.2	75.1	74.6	54.7	71.9	91.6	64.8
PI3	45.6	50.0	59.9	83.9	44.4	61.1	66.6	60.5	53.7	66.7	45.4
PI4	93.9	82.8	78.9	81.1	84.1	76.4	84.5	73.6	77.3	57.2	94.3
PI5	60.5	26.3	44.7	48.4	31.6	53.2	59.9	41.9	41.8	36.2	63.9
PI6	96.2	75.2	93.2	93.3	58.4	91.4	86.5	78.3	76.0	77.4	42.8
PI7	72.1	72.4	80.6	86.9	77.2	81.9	87.3	78.7	75.9	79.7	71.4
PI8	64.4	58.7	56.5	61.1	61.2	62.4	59.5	55.7	56.3	63.3	64.1
PI9	81.9	80.5	79.0	82.8	78.5	83.8	82.3	79.1	75.5	85.1	78.8
PI10	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2	79.2
PI11	60.0	75.0	70.0	90.0	80.0	85.0	70.0	80.0	75.0	70.0	70.0
PI12	60.0	60.0	80.0	70.0	70.0	60.0	70.0	70.0	70.0	50.0	50.0

Notes:

PI — partial indices. With regard to PI2 (judicial effectiveness) and PI6 (fiscal health), data were available for the period 2017–2022.

Source: The Heritage Foundation (2022).

**Table 5.**  
**Clusters for partials indices of freedom in period 1996–2022**

Partials indices of freedom	Cluster 1	Cluster 2	Cluster 3
PI1	CZR, EST, HUN, POL, SLV	CRO, BUL, ROM	LIT, LAT, SLK
PI2	CZR, CRO, HUN, LIT, POL, SLV, ROM	EST	SLK, BUL
PI3	CZR, HUN, POL, SLK	EST, SLV	CRO, LIT, LAT, BUL, ROM
PI4	CZR, EST, CRO, HUN, LIT, LAT, POL, SLK	SLV	BUL, ROM
PI5	CZR, CRO, POL, SLK, SLV	EST, LAT, LIT, BUL, ROM	HUN
PI6	CZR, EST, LAT, LIT, BUL	CRO, HUN, POL, SLK, SLV	ROM
PI7	CZR, EST, LIT, LAT, SLV	CRO, BUL, ROM	HUN, POL, SLK
PI8	CZR, HUN, LAT, LIT, POL, ROM	EST, CRO, SLV	SLK, BUL



Partials indices of freedom	Cluster 1	Cluster 2	Cluster 3
PI9	CZR, EST, CRO, HUN, LIT, LAT, POL, SLK, SLV	BUL	ROM
PI10	CZR, EST, SLK, ROM	CRO, HUN, LIT, LAT, POL, SLV	BUL
PI11	CZR, CRO, HUN, LAT, LIT, SLK	EST	POL, SLV, BUL, ROM
PI12	CZR, EST, LIT, SLK	CRO, HUN, LAT, POL, BUL	SLV, ROM

Notes:

OI — overall index of freedom, PI1 — property right, PI2 — judicial effectiveness, PI3 — government integrity, PI4 — tax burden, PI5 — government spending, PI6 — fiscal health, PI7 — business freedom, PI8 — labour freedom, P9 — monetary freedom, PI10 — trade freedom, PI11 — investment freedom, PI12 — financial freedom.

BUL — Bulgaria, CZR — Czech Republic, CRO — Croatia, EST — Estonia, HUN — Hungary, LIT — Lithuania, LAT — Latvia, POL — Poland, SLK — Slovakia, SLV — Slovenia and ROM — Romania.

Source: Own calculation.

**Table 6.**  
**Summary conclusions resulting from cluster analysis**

Countries	OI	PI1	PI2	PI3	PI4	PI5	PI6	PI7	PI8	PI9	PI10	PI11	PI12	Total
LIT-LAT	√	√	√	√	√	√	√	√	√	√	√	√		12
HUN-POL	√	√	√	√	√		√	√	√	√	√		√	11
CZR-LIT	√			√	√		√	√	√	√		√	√	9
CZR-LAT	√			√	√		√	√	√	√		√		8
CRO-HUN	√			√	√		√			√	√	√	√	8
CRO-POL	√			√	√	√	√			√	√		√	8
POL-SLV	√	√		√		√	√			√	√	√		8
CZR-EST		√			√		√	√		√	√		√	7
CZR-HUN		√	√	√	√				√	√		√		7
CZR-POL		√	√	√	√	√			√	√				7
CZR-SLK			√		√	√				√	√	√	√	7
CRO-LAT			√	√	√					√	√	√	√	7
CRO-SLV	√			√		√	√		√	√	√			7
HUN-LAT				√	√				√	√	√	√	√	7
HUN-SLK	√		√		√		√	√		√		√		7
POL-SLK	√		√		√	√	√	√		√				7
BUL-ROM	√	√	√		√	√		√				√		7
EST-LIT					√	√	√	√		√			√	6
CRO-LIT			√	√	√					√	√	√		6
CRO-SLK	√				√	√	√			√		√		6
HUN-LIT				√	√				√	√	√	√		6
HUN-SLV	√	√		√			√			√	√			6
LAT-POL				√	√				√	√	√		√	6
CZR-CRO				√	√	√				√		√		5
CZR-SLV		√		√		√		√		√				5
EST-LAT					√	√	√	√		√				5



Countries	OI	PI1	PI2	PI3	PI4	PI5	PI6	PI7	PI8	PI9	PI10	PI11	PI12	Total
EST-SLV		✓	✓					✓	✓	✓				5
CRO-BUL	✓	✓	✓					✓					✓	5
CRO-ROM	✓	✓	✓	✓				✓						5
LIT-POL				✓	✓				✓	✓	✓			5
LIT-SLK		✓			✓					✓		✓	✓	5
EST-SLK					✓					✓	✓		✓	4
LIT-SLV				✓				✓		✓	✓			4
LIT-ROM			✓	✓		✓			✓					4
LAT-SLK		✓			✓					✓		✓		4
LAT-SLV				✓				✓		✓	✓			4
LAT-BUL			✓			✓	✓						✓	4
LAT-ROM			✓	✓		✓			✓					4
POL-ROM	✓			✓					✓			✓		4
SLK-SLV	✓					✓	✓			✓				4
SLV-ROM	✓			✓								✓	✓	4
CZR-ROM				✓					✓		✓			3
EST-CRO					✓				✓	✓				3
EST-HUN		✓			✓					✓				3
EST-POL		✓			✓					✓				3
HUN-ROM	✓			✓					✓					3
LIT-BUL			✓			✓	✓							3
POL-BUL	✓											✓	✓	3
SLK-BUL	✓			✓					✓					3
EST-BUL						✓	✓							2
EST-ROM						✓					✓			2
HUN-BUL	✓												✓	2
SLK-ROM	✓										✓			2
SLV-BUL	✓										✓	✓		2
CZR-BUL							✓							1

## Notes:

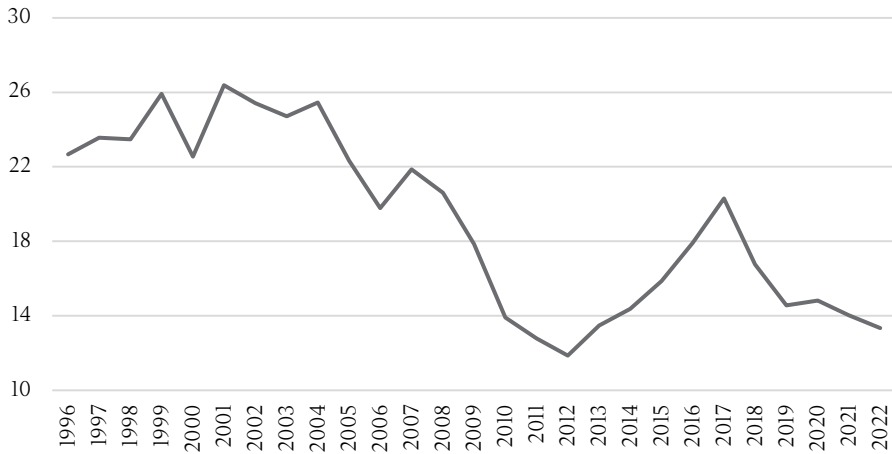
OI — overall index of freedom, PI1 — property right, PI2 — judicial effectiveness, PI3 — government integrity, PI4 — tax burden, PI5 — government spending, PI6 — fiscal health, PI7 — business freedom, PI8 — labour freedom, P9 — monetary freedom, PI10 — trade freedom, PI11 — investment freedom, PI12 — financial freedom.

BUL — Bulgaria, CZR — Czech Republic, CRO — Croatia, EST — Estonia, HUN — Hungary, LIT — Lithuania, LAT — Latvia, POL — Poland, SLK — Slovakia, SLV — Slovenia and ROM — Romania.

Source: Own calculation.

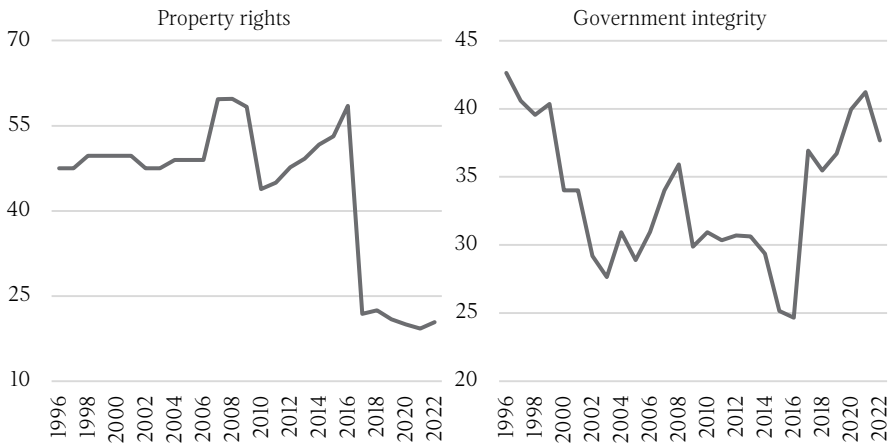


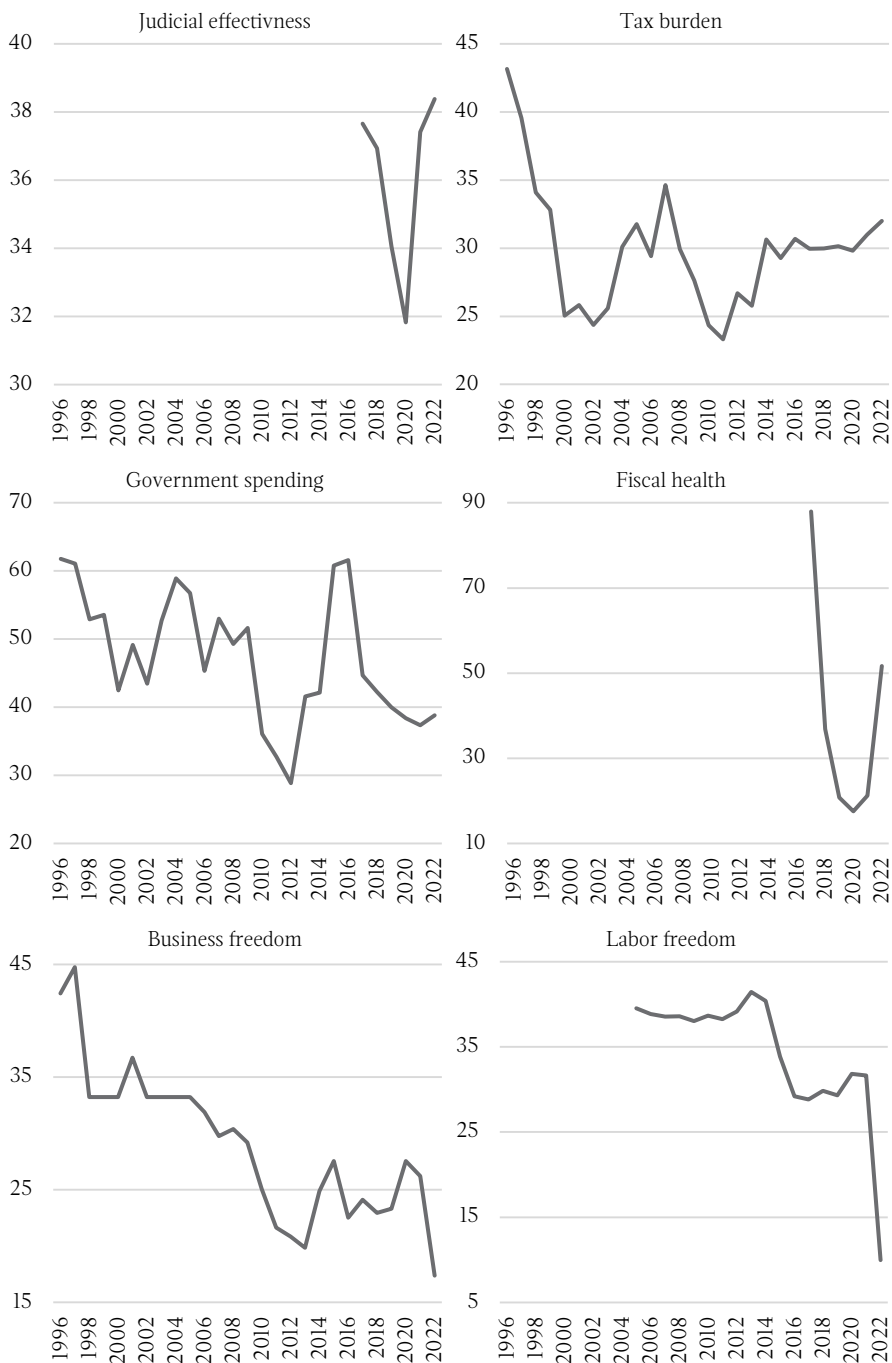
**Chart 1.**  
Heritage Economic Freedom, overall Score:  $\sigma$ -convergence or  $\sigma$ -divergence

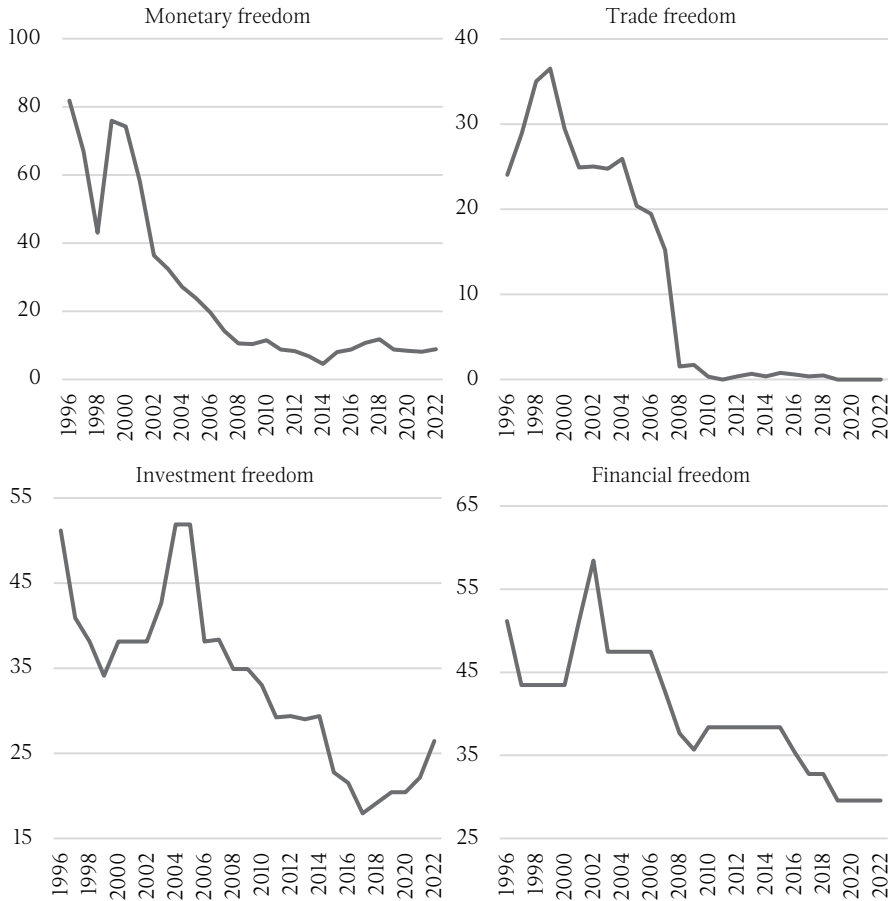


Source: Own calculation.

**Chart 2.**  
Partial indices of economic freedom:  $\sigma$ -convergence/divergence or stagnation



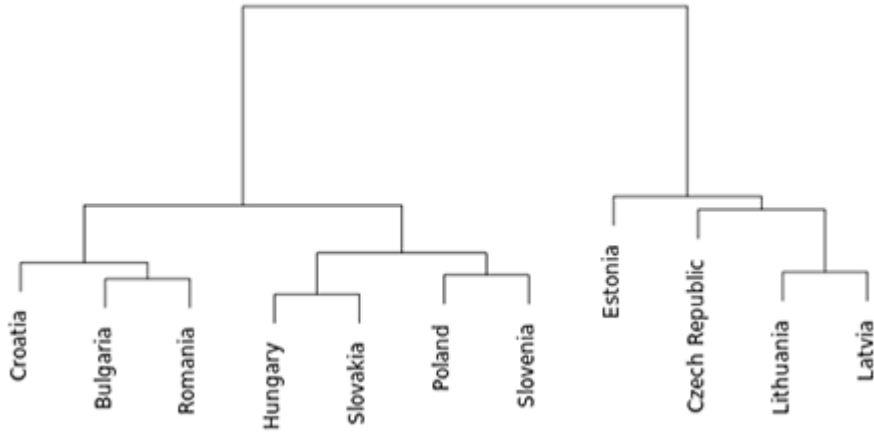




Source: Own calculation.

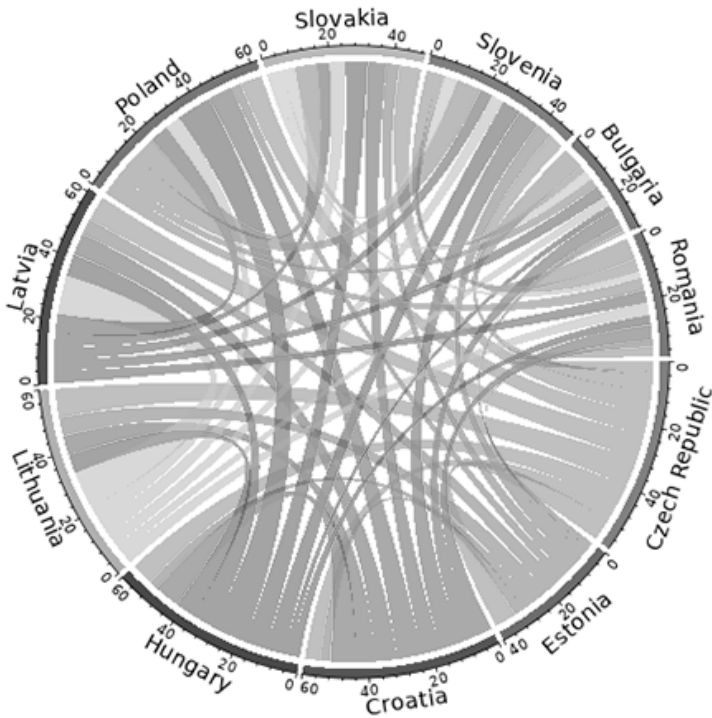


Chart 3.  
Dendrogram of Heritage Economic Freedom: overall score



Source: Own calculation.

Chart 4.  
Summary conclusions



Source: Table 6.