# PARTIAL LEAST SQUARES REGRESSION (PLSR) APPLIED FOR ASSESSING THE ECONOMIC RESILIENCE IN EU COUNTRIES

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***Abstract:*** *The assessment of the economic resilience requires the analysis of the resilience as a process by using a multidimensional approach. In the paper, by using two quantitative measures of economic resilience, the GDP growth rate and the employment rate, we identify the most important determinants which have an influence on economic resilience for the EU countries, taking into account the economic, social and institutional dimensions. By applying the partial least squares regression (PLSR) for data registered for the period 2008-2021, we estimate a model for the European Union countries, distinct for the three stages of the resilience process: resistance, recovery and transformation. Our results show that the crisis of 2008 was felt more on the economic and social dimensions, resilience in the EU countries getting higher scores with the solidity of their institutional system.*
***Keywords:*** *economic resilience analysis; multivariate analysis; partial least squares regression.*

## Introduction

The analysis of economic resilience and a country's ability to recover after a shock is one of the most debated topics in the literature. The global financial crisis from 2009, the health crisis which occurred in 2020, the war from Ukraine and the multiple, global economic, social and political challenges it generated accentuated the importance of identifying paths for resilience growth of a country. The complexity of resilience analysis is given by the need to approach resilience from a multidimensional and systemic approach. A resilient economy is resistant to change and conservation of existing structures (Folke, 2006) and it has the ability to build and increase the capacity to adapt to changes and to transform by creating a new system (Berkes et al., 2003). To measure the economic resilience, the literature uses two indicators: the GDP growth rate (Davies, 2011; Pontarollo and Serpieri, 2020) and the employment rate (Sensier et al., 2016; Fingleton et al., 2012; Doran and Fingleton, 2015; Giannakis and Bruggeman, 2020). Higher growth rates for the GDP may show a more resilient economy, capable to tackle shocks and recover more rapidly, while higher workforce occupancy may indicate a more resilient economy with more employment and stability opportunities on the labor market.

In the current paper, we will analyze economic resilience from a multidimensional perspective, by taking into consideration the economic, social and institutional dimensions. The economic dimension of economic resilience refers to the ability of an economy to resist and recover after certain economic shocks, as well as its ability to maintain its stability, to adjust to changing conditions and recover after unforeseen events. The institutional dimension of economic resilience points out to the characteristics and effectiveness of official institutions in a society such as governmental agencies, regulatory bodies, legal

framework, governance structures, which may strengthen its capacity to resist and recover following certain economic shocks. The social dimension of economic resilience means a society's ability to recover after the occurrence of economic shocks without getting the welfare and social cohesion of its members affected.

The analysis of economic resilience as a process will be performed by considering the three stages, of resistance, recovery and transformation. The boundaries among these periods will be set up in accordance with the most important resilience indicator, namely the *employment rate*, for all EU countries. Given the short time period since the COVID-19 health crisis, the delimitation of these periods in relation to this moment is not possible. In the paper, the objectives pursued have been to identify the main influence factors on the capacity of economic resilience of EU countries, for each of the three periods of the resilience process. For the data registered for the period 2008-2021, we applied the *partial least squares regression (PLSR)* considering as dependent variables the GDP growth rate and the employment rate, while as independent variables we considered 19 indicators which measure the economic, social and institutional dimensions. The data processing was conducted by using the *R* software.

The paper is structured as follows: in Section 2 we will briefly present the literature study on economic resilience. Section 3 presents the data and methodology used for the analysis of economic resilience capacity while Section 4 describes the empirical analysis for the 27 EU countries. The last sections draws the main discussion and conclusions of our empirical results.

## Literature review

The economic resilience is the ability of the economy to maintain or return to an equilibrium state after the occurrence of exogenous shock. Various authors (Feyrer, Sacerdote and Stern, 2007; Blanchard and Katz, 1992) studied the extent to which the national economy can return to its previous level of output or employment after an external shock. Martin (2012) highlights that the main stages of resilience analysis as a process are resistance – absorption, recovery and transformation. Resistance, that is the vulnerability or the sensitivity of a regional economy to various disturbances such as recessions, is an economy's ability to resist economic shocks and minimize their impact. The resistance of an economy can be supported by prudent fiscal and monetary policies, solid regulations and legal framework as well as by managing risks and economic volatility (Albala-Bertrand, 1993; Rose, 2007) or through infrastructure investments and health and education services needed to mitigate the risks associated with natural disasters (Albala-Bertrand (1993). At the same time, economic and revenue diversification may mitigate the economic vulnerability to market fluctuations and to shocks in the export sector (Hausmann et al., 2011).

Recovery refers to the recovery speed after such a disturbance. Recovery means an economy's ability to return to a normal functioning level or even improvement after an economic shock or a crisis. A resilient economy has the capacity to recover quickly and to return to a sustainable economic growth after a decline period. Adequate policies to stimulate the economy, infrastructure investments and the support of affected sectors may contribute to the rapid recovery of an economy after a downturn period (Blanchard, 2019; IMF, 2020).

Transformation refers to the renewal degree or restart of the growth period that characterized the regional economy before the shock. This process can be supported by investments in research, development, education and training as well as by stimulating innovation and entrepreneurial spirit (Romer, 1986; Mazzucato, 2018) or by means of incentive policies for research and development, promotion of collaboration between the public and private sector as well as the support of start-ups and innovative companies. Aghion and Howitt (2009) state that constant innovation and renewal are essential in order to support long-term economic growth and to ensure the economic resilience faced with technological and market changes. The authors underline that investing in research and development, innovation and adjustment to the new technologies can contribute to economic renewal and maintenance of the competitive edge of an economy. Economic renewal may enhance the creation of new sources of economic development, the development of new markets as well as the adaptation to technological and market changes.

## Data and methodology

In the paper, we will analyze economic resilience of the European Union countries, using indicators that reflect the economic, social and institutional dimensions from the period 2008-2021. As dependent variables, we took into consideration two quantitative measures of resilience that focused on the labor market and economic growth aspects: the *GDP growth per capita* (%) and *Employment rate* (%). The independent variables under consideration are registered for the assessment of economic, social and institutional dimensions, used in a previous paper (Ifrim & al. 2022). In this paper, we will analyze the economic resilience capacity, differently for each of the three stages of the resilience process.

For the economic resilience, we took into account the following indicators as variables: *government budget deficit ratio* (% of GDP), *national debt* (% of GDP), *size of government* (the ratio of government expenditures to the total output of the economy, % of GDP), *freedom to trade*, *foreign direct investment - net inflows* (% of GDP), *the value added of agriculture, services and industry* (% of GDP) and *inflation* (%).

The social dimension is evaluated by means of the following indicators: *education index*, *population by educational attainment level* (% of a country comprised between 15 and 64 years old according to the educational level, kindergarten, primary and secondary*)* and *life expectancy at birth* (years). For the institutional dimension, we considered the following indicators: *government effectiveness*, *regulatory quality*, *rule of law*, *control of corruption*, *political stability and absence of violence/terrorism, legal system and property rights* and *voice and accountability.* The data sources used are World Bank, Eurostat, OECD, Econstats, The Global Economy, Country Economy.

In order to identify the main influence factors on economic resilience, we applied the *Partial Least Squares Regression* (PLSR) method. The PLSR method is a recent technique that generalizes the Principal Component Analysis (PCA) method and the multiple linear regression, which aims to predict a set of dependent variables by means of a set of independent variables. This prediction is performed by extracting a set of orthogonal factors named latent factors that explain the highest percentage of the variance explained. PLSR is a method that is applied when the number of predictors is high. As in

the multiple linear regression, the main goal of the PLSR regression is to build a linear model that can be written under a matrix form as follows:

$$Y = \beta X + \varepsilon$$

where *X* is a matrix of the form $I \times J$, having the elements $x_{ij}$, *Y* is a matrix of the form $I \times K$ with the elements $y_{ik}$, $\beta$ are the regression coefficients, and ε is the residual.
The matrices *X* and *Y* are as a rule, standardized. The PLSR model produces latent vectors under the form of linear combinations of the original predictors.
PLSR decomposes *X* and *Y* as a product of a common set of orthogonal factors and a set of specific loadings.
Therefore, the variable *X* is decomposed as:

$$X = TP^T, with\ T^T T = I,$$

where *I* is the identity matrix. *T* is the score matrix (or the latent vectors matrix), while *P* is the matrix of components or loadings (in the PLS regression, as well as in PCA, the loadings are orthogonal). At the same time, *Y* is estimated as:

$$\hat{Y} = TBC^T,$$

where *B* is a matrix diagonal with the "regression weights" on the main diagonal and *C* is the "matrix of weights" of dependent variables. When the number of columns in matrix *T* is equal to the order of *X*, an exact decomposition of *X* is being made.
Latent vectors are calculated by means of iterative applications by using *Singular Value Decomposition* (SVD). Each SVD iteration leads to obtaining orthogonal latent vectors for *X* and *Y* and for the corresponding regression coefficients. For PLSR, this comes down to finding two sets of weights *w* and *c* to create a linear combination of columns for *X* and *Y*, so that their covariance is maximum. More exactly, the goal is to obtain a first pair of vectors $t = Xw$ and $u = Yc$ with the limitations: $w^T w = 1, t^T t = 1$ and $t^T u = Xw$ should be maximum.

## Empirical results

In the empirical study undertaken for the 27 European Union countries, we analyzed the resilience as a process and we identified the three stages of this process (resistance, recovery and transformation), by taking into consideration *employment rate*, for all EU countries. For each of these three periods, the PLSR method was applied, taking into account *GDP growth rate* and *employment rate* as dependent variables and the economic, social and institutional dimensions as independent variables. Following the descriptive analysis of dependent variables, the authors present the results regarding the estimation of the PLSR models for the 3 stages and the main influence factors on the economic resilience capacity of EU countries.

*Data summary*

The evolution of the occupancy rate of the EU countries during the period 2008-2021 is presented in the figure below:

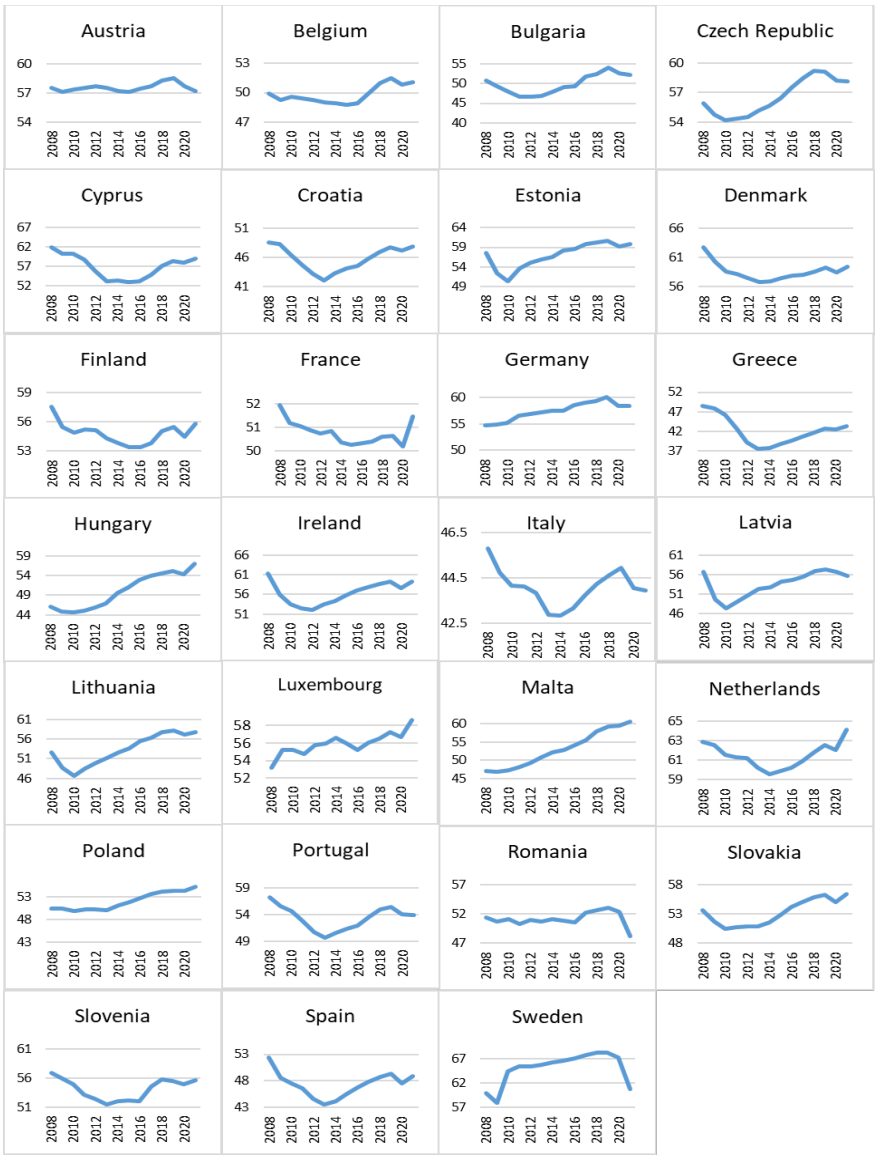


**Figure 1. Dynamic of employment rate in EU countries, during 2008-2021**

The diagram in the figure above highlights that the majority of EU countries recorded a descending trend of the occupancy rate after the start of the global financial crisis in 2008 while the mitigation rhythm was different. Austria, Belgium, Poland and Romania were the countries that registered the smallest variations in the occupancy rate after the shock, while Luxembourg, Malta and Germany are the countries which were not affected by the 2008 crisis from the point of view of occupancy rate.

The evolution of GDP growth rate of EU countries during the period 2008-2021 is presented in the figure below:

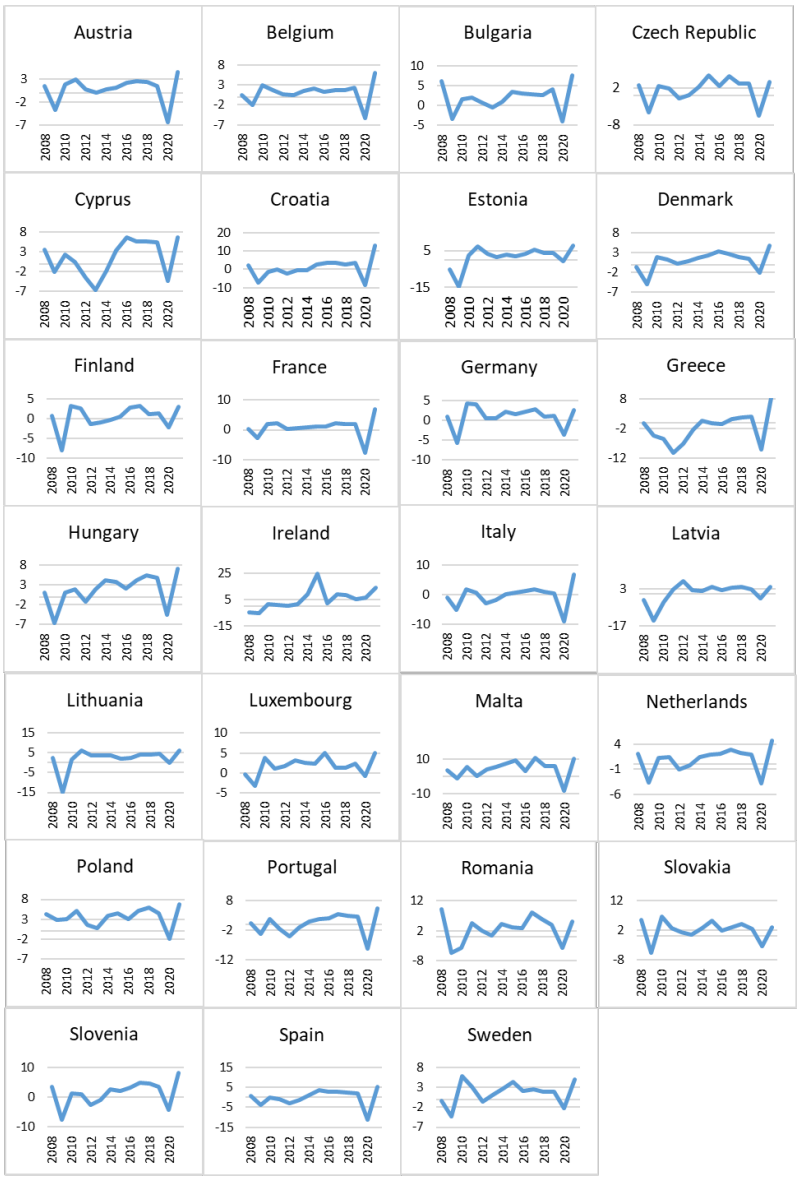


**Figure 2.** ***Dynamic of GDP growth rate in EU countries, during 2008-2021***

The diagram in the figure above highlights that the EU countries registered high variations of the GDP growth rate, after the year 2008. The highest reductions in the GDP growth rate were registered by Estonia, Latvia and Lithuania, of approximately 14%, in 2009. Poland is the only country that had a positive GDP growth rate of 2.8%, in 2009.

*Defining the periods specific to the resilience process*

The determination of the resistance, recovery and transformation periods was performed by analyzing the average value of the *employment rate* at EU level, which is thought to be the main indicator for the analysis of economic resilience (Sensier et al., 2016; Davies, 2011; Doran and Fingleton, 2015; Giannakis and Bruggeman, 2020; Pontarollo and Serpieri, 2020; Beyers, 2013).

The period 2008-2021 was split in three intervals corresponding to the three stages of resilience – resistance, recovery and transformation. For their time delimitation, we took into consideration the shock caused by the economic crisis that occurred in 2008. Thus, we registered the maximum value of the variable recorded during the period 2007-2008-2009 (the period before the economic crisis), while the year corresponding to the maximum value is the year when the crisis was felt the strongest after the shock caused by the crisis. The graphical representation of the average rate of workforce occupancy for EU countries used to identify the three periods of the resilience process, is conducted in the figure below:

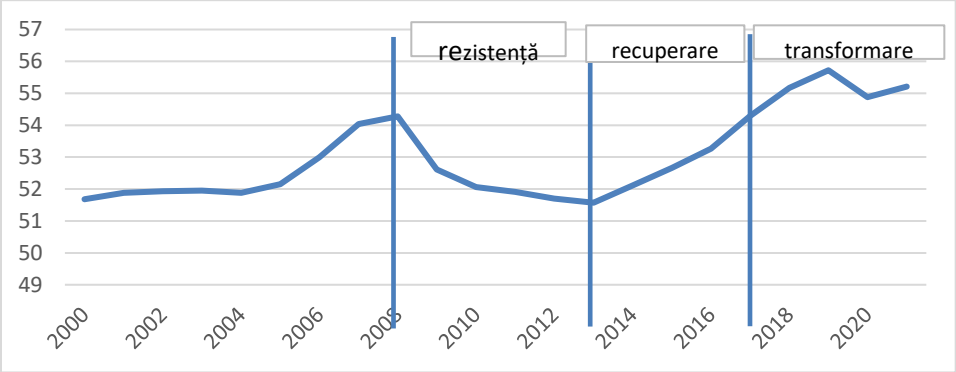


**Figure 3: Average workforce occupancy rate for the European Union countries**

As it can be noticed in the figure above, the three periods identified in the evolution of the average occupancy rate at the level of EU countries are the following:
the resistance period: 2008-2013;
the recovery period: 2013-2017;
the transformation period: 2017-2021.
We must mention that for the transformation period, Finland was eliminated from the analysis because it did not succeed to reach again/to exceed the maximum value from before the shock for none of the dependent variables.

## Presentation of the PLSR model

After defining the three periods, we applied the PLSR model separately for these periods, considering as dependent variables *GDP growth rate* and *employment rate*.

*4.2.1 Choosing the factors that explain the highest weight of the variance explained*
For the choice of the number of factors that explain a high percentage, of over 75%, of the total variance of dependent variables, we used the adjustment criterion *FIT*. The synthetic presentation of the variance of dependent and independent variables explained by the factors extracted is performed in Annex 1 (Tables1, 2 and 3), individually for the 3 periods of the resilience process.

The data from table 1 (Annex 1) highlight the fact that for the period 2008-2013, for most of the countries, the highest percentage of the variance is explained by the first two factors. The exception is represented by Poland, Romania, Slovakia and Hungary. For the period 2013-2017, most of the variance of independent, respectively dependent variables, is explained by the first two factors. For the last period under consideration,

2017-2021, the variance of independent, respectively dependent variables is explained by the first two factors for all countries, with the exception of Belgium and Portugal. Given the reduced number of countries for which three factors were extracted, the identification of the variables which explain the analysis of these factors will be performed only for the first two factors.

*4.2.1 Identifying the influence of factors on the dependent variables*

To identify the influence of factors on the dependent variables, we took into consideration the correlation matrix between the dependent variables and each factor. After summarizing the results obtained, the groups of countries are presented in the following table.

**Table 9: Arranging the countries in relation to the dependent variable defined by each factor**

| Period | Factor 1 | | Factor 2 | |
|---|---|---|---|---|
| | Employment rate | GDP growth rate | Employment rate | GDP growth rate |
| 2008-2013 | Austria, Belgium, Bulgaria, Czech Republic, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Luxemburg, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden | Czech Republic, Cyprus, Estonia, Ireland, Latvia, Lithuania, Poland, Romania | Czech Republic, Estonia, Hungary, Latvia, Lithuania | Austria, Belgium, Bulgaria, Czech Republic, Croatia, Cyprus, Denmark, Finland, France, Greece, Germany, Hungary, Ireland, Italy, Lithuania, Luxemburg, Malta, The Netherlands, Poland, Sweden, Portugal, Romania, Slovakia, Slovenia, Spain, |
| 2013-2017 | Belgium, Bulgaria, Czech Republic, Croatia, Denmark, Estonia, France, Finland, Germany, Greece, Ireland, Latvia, Lithuania, Luxemburg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Hungary | Austria, Bulgaria, Cyprus, Croatia, Finland, France, The Netherlands, Czech Republic, Denmark, Italy, Greece, Germania, Spain, Latvia, Poland, Slovenia, Romania, Portugal | Austria, Belgium, Czech Republic, Cyprus, Finland, France, Germany, Italy, The Netherlands, Slovenia Portugal, Romania, | Belgium, Bulgaria, Czech Republic, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Latvia, Lithuania, Luxemburg, Malta, Poland, Romania, Slovakia, Spain, Sweden, Hungary |
| 2017-2021 | Austria, Czech Republic, Cyprus, Denmark, Estonia, France, Germany, Greece, Italy, Latvia, Luxembourg, Malta, The Netherlands, Poland, Portugal, Spain, Sweden, Hungary | Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Germany, Ireland, Lithuania, Luxembourg, Portugal, Romania, Sweden, Slovakia, Slovenia, Spain | Belgium, Bulgaria, Croatia, France, Ireland, Lithuania, Luxembourg, Romania, Spain, Slovakia, Slovenia | Austria, Czech Republic, Cyprus, Denmark, Estonia, Germany, Greece, Italy, Latvia, Luxembourg, Malta, The Netherlands, Poland, Portugal, Sweden, Spania, Hungary |

As it can be observed, during the resistance period (2008-2013), for most of the countries, a higher influence on *employment rate* was registered. The countries for which the GDP influence was higher are Czech Republic, Cyprus, Estonia, Ireland, Latvia, Poland and Romania. These countries, especially Estonia and Latvia, registered significant GDP falls in the first year after the start of the economic crisis. Poland is the only country which did not register an economic downturn after that moment.
During the recovery period, 2013-2017, for the majority of the EU countries, a significant influence on *employment rate* and *GDP* was registered. During the transformation period, 2017-2021, for some countries, the influence on GDP was higher (Bulgaria, Croatia, Lithuania, Romania, Slovakia and Slovenia).

*4.2.1 Identifying the variables which explain the factors*

The presentation of variables which explain the analysis of factors is performed synthetically in Annex 2, distinctively for each of the stages of the resilience process.
The results obtained highlight that during the period 2008-2013, the main variables that explain the factor whose highest influence is on employment rate are *national debt, life expectancy at birth, population by educational attainment level* (Belgium, France, Italy, Finland, The Netherlands, Ireland, Luxembourg, Spain, Croatia, Denmark and Poland). To these variables, we can add *the value added of industry (% of GDP), government effectiveness, regulatory quality and education index*, in the case of Denmark and Poland, and *the value added of services (% of GDP), voice and accountability* and *political stability and absence of violence*, in the case of Ireland, Luxembourg, Spain and Croatia. These results emphasize that during the resistance period, the institutional dimension had a higher impact on the labor market than on the economy.

During the period 2013-2017, the main variables which explain the factor whose highest influence is on employment rate are *national debt, political stability and absence of violence, corruption control, life expectancy* and *population by educational attainment level* in the case of Belgium, Germany, Denmark, Finland and Hungary*, and the value added of industry (% of GDP), the governmental budget deficit, the value added of services (% of GDP) and the legal system and the property rights* in the case of Estonia, Lithuania, Bulgaria, Spain, Malta and Ireland. The results obtained show that during the recovery stage, the economic and social dimensions had a higher impact on the labor market than on the economy.

For the same period, the variables which explain the factor analysis with the highest influence on the GDP growth rate are *the value added of industry (% of GDP), government effectiveness, population by educational attainment level* and *life expectancy at birth*, for France, The Netherlands, Romania and Slovenia. During the period 2017-2021, the factor which influences the workforce occupancy rate is explained by *the value added of industry (% of GDP), the governmental budget deficit and the educational attainment level* for most of the countries such as Austria, Czech Republic, Cyprus, Estonia, Greece, Malta, The Netherlands, Poland, Hungary, Portugal and Germany. At the same time, other variables that explain the factor analysis 1 are: *the value added of services (% of GDP)* present in Austria, Czech Republic, Denmark, Estonia, France, Germany, Greece, Malta, The Netherlands, Poland and Hungary; *control of corruption* present in the following countries: Austria, Czech Republic, Cyprus, Denmark, Estonia, France, Greece, Italy, Luxembourg,

Malta, The Netherlands, Poland and Hungary; *freedom of trade*, a variable present in Cyprus, France, Germany, Greece, Italy, Malta, The Netherlands and Portugal.
When speaking about the influence of factor 1 on the GDP growth rate, we can state that for Belgium, Bulgaria, Croatia, Ireland, Lithuania and Slovenia, this factor is described by the *inflation of consumption prices*. In the case of Belgium, Croatia, Ireland, Lithuania and Slovenia, the factor is also explained by *the size of the government*. For Slovenia, Slovakia, Romania, Croatia and Belgium, the variable *freedom of trade* also explains factor 1.

**Discussion**

Assessing the resilience of a system after the installation of a crisis is quite important for the strategic planning process, because in such critical moment the weaknesses of the countries can be identified with more precision. Through their knowledge and awareness, the institutions can intervene specifically, so that disasters do not cause significant disruptions to the quality of life and the smooth running of society. The research applied for evaluating the economic resilience in EU countries highlighted that for *the period of resistance (2008-2013),* the largest explained variance of the independent variables was in the case of Belgium (68.82%) for factor 1, most of the selected indicators influencing the employment, excluding inflation, which for this state had a greater impact on GDP. The Czech Republic, on the other hand, has the lowest explained variance of the independent variables for factor 1 (22.93%), among the institutional indicators the one relating to governmental effectiveness having influence on employment, and the one concerning political stability on GDP. Romania records the following values: variance explained of the independent variables: 40.01% for factor 1 and 26.64% for factor 2, and the variance explained of the dependent variables: 37.6% for factor 1 and 25.28 for factor 2. According to PLS regression, in Romania, during the period of resistance, employment has been modelled by several factors, such as: FDI, inflation, rule of law, government effectiveness, and control of corruption. GDP experienced changes depending on the government deficit/surplus, the education level of the population and political stability. Regarding the Baltic States, they have relied on the service sector, industry and agriculture to recover after the crisis, these areas having repercussions on both GDP and employment. For *the recovery period (2013-2017)*, the highest variance explained of the independent variables is in the case of Malta (65.37%), with influences on employment from FDI, industry, agriculture, services, trade, but also as a result of some government indicators (government size, government deficit, legal system, etc.). Austria has the lowest variance (30.81%), the educational index and political stability being among the indicators that contributed most to GDP growth. In Romania, it seems that in the period 2013-2017, political stability had a particular impact on employment. If inside a country there are no disputes between governing parties, which could jeopardize the dynamics of the business environment, there is a greater probability of increasing resilience, because in this way there is no diversion from the problems of national interest, which should be resolved immediately, without affecting the economy. On the contrary, in the case of political disputes, the resolution of various issues is postponed, they become more and more serious and difficult to solve. *The transformation period (2017-2021)* meant, in the case of many EU states, exceeding the GDP and employment levels compared to those from the moment when the 2008 crisis appeared, and Table 3 (Appendix 1) shows that the

largest variance explained of the dependent variables is found in the case of Luxembourg (89.86%) for factor 1 and Hungary (61.07) for factor 2. Both countries channelled their efforts to accelerate resilience by increasing the employment rate, investing in education and corruption control. The other dependent variable, GDP, was mainly influenced by FDI and trade freedom.

## Conclusions

The analysis of economic resilience has become one of the most debated topics among experts from different areas, especially during the current period, after the numerous economic shocks generated by the COVID-19 crisis, the war from Ukraine, the increase in energy prices and the various global economic, social and political challenges. Given the complexity of the resilience process, the current paper analysed the economic resilience capacity of the European Union countries, distinctively for the stages of resistance, of recovery and of transformation (Martin, 2012). For the data registered during the period 2008-2021, we applied the *partial least squares regression* (PLSR) method, by taking into consideration as dependent variables *employment rate* and *the GDP growth rate*, and as independent variables 19 indicators that measure the economic, social and political dimensions.

The road to resilience of EU countries was not identical after the 2008 crisis, the two dependent variables (GDP growth and employment rate) being influenced by the weight of internal factors. Anyway, the dynamics of each national economy has been modeled by the condition in which it was when the global crisis triggered: if the economic and institutional climate had been sound at that time, this would have led to a higher capacity to withstand the shock, while countries that were not adequately equipped with intervention tools suffered worse consequences (Nijkamp et al., 2022). For the three analyzed periods, the factors that have been shown to have a great impact on the level of employment are those regarding national debt, control of corruption, the educational level, regulatory quality and the rule of law. Countries that record high public debts, widespread corruption, poor education, accompanied by weak regulations and a deficient functioning of the rule of law do not have the ability to attract foreign direct investments and to create new jobs, which explains why, on average, the EU states recovered more difficult in terms of employment than in relation to GDP after the crisis and especially the Mediterranean ones, where there is no wide diversification of economic activities, the emphasis falling more on tourism. In Eastern Europe, agriculture is a basic field of activity, but many people are employed seasonally or part-time. Then, the crisis forced many entrepreneurs to close their businesses, the unemployment rate increasing a lot, particularly among young people, which aggravated the situation. The average employment rate in the EU states decreased continuously after 2008, and the lowest rates were recorded around 2013-2014 years, when Europe faced a new crisis, that of refugees, which deepened the employment problems. The EU started to recover its pre-crisis thresholds and to sit on the transformation path only after 2017. Regarding the GDP, from 2008 to 2021, it seems that it was mainly influenced by governmental surplus/deficit, inflation, trade freedom, FDI, size of government and political stability. Financial mechanisms can regulate economic activity, including the commercial side, and those countries whose exports are growing will have the capacity to increase their GDP and overcome shocks, passing on the road to recovery or

transformation. Also, political stability in a state gives confidence to investors and thus, its implications would spread both at the level of GDP and at the level of employability. Overall, the crisis of 2008 was felt more on the economic and social dimensions, resilience in the EU countries getting higher scores with the solidity of their institutional system (Nijkamp et al., 2022). Finally, resilience can be analyzed through the prism of many other indicators and we intend to extend the research, looking beyond GDP and employment.

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## Appendix 1. The variance of dependent and independent variables explained by the factors extracted

**Table no. 1:** ***Variance of the variables for the period 2008-2013***

| | **Factor 1** | | **Factor 2** | | **Factor 3** | |
|---|---|---|---|---|---|---|
| | Variance explained of the independent variables | Variance explained of the dependent variables | Variance explained of the independent variables | Variance explained of the dependent variables | Variance explained of the independent variables | Variance explained of the dependent variables |
| **Austria** | 35,24% | 71,25% | 9,2% | 26,82% | | |
| **Belgium** | 68,82% | 44,02% | 10,71% | 41,04% | | |
| **Bulgaria** | 50,15% | 58,69% | 29,43% | 25,23% | | |
| **Czech Republic** | 22,93% | 49,27% | 22,4% | 31,12% | | |
| **Cyprus** | 60,07% | 92,38% | 16,74% | 5,3% | | |
| **Croatia** | 66,12% | 48,5% | 12,76% | 35,98% | | |
| **Denmark** | 54,72% | 53,52% | 16,41% | 33,4% | | |
| **Estonia** | 48,27% | 43,88% | 25,84% | 35,51% | | |
| **Finland** | 59,23% | 48,77% | 14,63% | 42,61% | | |
| **France** | 49,18% | 52,89% | 20,01% | 37,7% | | |
| **Germany** | 44,69% | 62,81% | 14,92% | 34,96% | | |
| **Greece** | 60,68% | 58,7% | 18,31% | 35,33% | | |
| **Italy** | 48,95% | 48,28% | 22,05% | 32,73% | | |
| **Ireland** | 50,36% | 85,47% | 17,65% | 6,87% | | |
| **Latvia** | 47,4% | 39,92% | 27,05% | 52,07% | | |
| **Lithuania** | 30,58% | 59,88% | 43,09% | 20,62% | | |
| **Luxembourg** | 49,49% | 53,92% | 23,27% | 23,13% | | |
| **Malta** | 45,27% | 59,2% | 33,49% | 21,3% | | |
| **The Netherlands** | 54,84% | 47,84% | 23,10% | 30,61% | | |
| **Poland** | 53,08% | 39,49% | 23,92% | 25,42% | 10,92% | 15,29% |
| **Portugal** | 50,3% | 58,07% | 12,97% | 27,57% | | |
| **Romania** | 40,01% | 37,6% | 26,64% | 25,28% | 17,86% | 18,69% |
| **Slovakia** | 44,87% | 44,11% | 27,59% | 23,07% | 12,51% | 23,81% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Slovenia** | 46,74% | 48,27% | 27,15% | 38,35% | | |
| **Spain** | 62,45% | 59,50% | 18,94% | 29,54% | | |
| **Sweden** | 37,62% | 55,14% | 43,94% | 17,55% | | |
| **Hungary** | 42,59% | 47,88% | 29,01% | 14,95% | 13,24% | 21,65% |

**Table no. 2:** ***Variance of the variables for the period 2013-2017***

| | **Factor 1** | | **Factor 2** | |
|---|---|---|---|---|
| | Variance explained of the independent variables | Variance explained of the dependent variables | Variance explained of the independent variables | Variance explained of the dependent variables |
| **Austria** | 30,81% | 64,76% | 39,17% | 33,03% |
| **Belgium** | 50,61% | 43,79% | 19,5% | 41,54% |
| **Bulgaria** | 51,09% | 74% | 23% | 14,22% |
| **Czech Republic** | 48,53% | 77,68% | 31,25% | 13,27% |
| **Cyprus** | 56,25% | 64,72% | 17,69% | 31,87% |
| **Croatia** | 41,45% | 89,2% | 22,24% | 7,28% |
| **Denmark** | 53,72% | 94,04% | 16,74% | 4% |
| **Estonia** | 57,31% | 71,17% | 16,66% | 23,34% |
| **Finland** | 54,44% | 74,76% | 23,12% | 22,13% |
| **France** | 42,73% | 66,38% | 18,53% | 29,7% |
| **Germany** | 63,4% | 79,82% | 17,86% | 11,93% |
| **Greece** | 39,23% | 80,72% | 21,64% | 17,69% |
| **Italy** | 39,1% | 88,01% | 26,8% | 11,07% |
| **Ireland** | 51,02% | 51,09% | 32,82% | 33,61% |
| **Latvia** | 42,73% | 72,77% | 18,16% | 21,35% |
| **Lithuania** | 59,6% | 48,83% | 22,67% | 42,96% |
| **Luxembourg** | 42,18% | 53,44% | 23,78% | 29,76% |
| **Malta** | 65,37% | 56,91% | 13,07% | 28,82% |
| **The Netherlands** | 63,24% | 65,08% | 21,65% | 33,21% |
| **Poland** | 55,02% | 74,04% | 15,31% | 21,66% |
| **Portugal** | 59,65% | 95,81% | 13,28% | 2,88% |
| **Romania** | 60,28% | 57,54% | 13,36% | 39,58% |
| **Slovakia** | 32,05% | 60,05% | 31,8% | 31,82% |
| **Slovenia** | 43,17% | 77,99% | 37,53% | 10,51% |
| **Spain** | 55,01% | 84,5% | 24,81% | 12,67% |
| **Sweden** | 50,14% | 57,59% | 21,9% | 35,96% |
| **Hungary** | 48,34% | 57,77% | 14,96% | 35,5% |

**Table no. 3:** ***Variance of the variables for the period 2017-2021***

| | **Factor 1** | | **Factor 2** | | **Factor 3** | |
|---|---|---|---|---|---|---|
| | Variance explained of the independent variables | Variance explained of the dependent variables | Variance explained of the independent variables | Variance explained of the dependent variables | Variance explained of the independent variables | Variance explained of the dependent variables |
| **Austria** | 51,24% | 49,48% | 29,74% | 46,91% | | |
| **Belgium** | 32,93% | 50,96% | 49,48% | 21,86% | 14,32% | 27,08% |
| **Bulgaria** | 27,03% | 47,99% | 28,49% | 44,09% | | |
| **Czech Republic** | 51,97% | 46,22% | 29,03% | 38,37% | | |
| **Cyprus** | 55,27% | 44,29% | 24,62% | 42,93% | | |
| **Croatia** | 41,7% | 54,03% | 32,58% | 34,52% | | |
| **Denmark** | 51,1% | 54,67% | 24,32% | 27,52% | | |
| **Estonia** | 53,93% | 38,4% | 29,38% | 37,12% | | |
| **Finland** | 35,21% | 72,13% | 47,21% | 15,24% | | |
| **France** | 43,42% | 56,51% | 34,52% | 33,7% | | |
| **Germany** | 62,14% | 44,13% | 17,83% | 49,71% | | |
| **Greece** | 40,71% | 57,02% | 21,8% | 35,04% | | |
| **Italy** | 59,05% | 40,84% | 23,66% | 43,35% | | |
| **Ireland** | 29,04% | 56,13% | 52,59% | 23,59% | | |
| **Latvia** | 36,13% | 45,72% | 19,3% | 51,92% | | |
| **Lithuania** | 39,69 | 89,86% | 35,55% | 9,16% | | |
| **Luxembourg** | 55,32% | 51,38% | 22,47% | 43,37% | | |
| **Malta** | 55,66% | 46,52% | 19,62% | 46,43% | | |
| **The Netherlands** | 56,06% | 46,22% | 21,95% | 52,28% | | |
| **Poland** | 62,02% | 34,23% | 21,75% | 35,11% | 10,83% | 26,51% |
| **Portugal** | 53,95% | 44,34% | 22,47% | 54,85% | | |
| **Romania** | 32,85% | 62,62% | 40,91% | 29,42% | | |
| **Slovakia** | 33,41% | 64,89% | 19,39% | 21,81% | | |
| **Slovenia** | 44,57% | 61,11% | 29,39% | 21,32% | | |
| **Spain** | 46,35% | 72,82% | 37,79% | 23,02% | | |
| **Sweden** | 56,67% | 38,39% | 18,83% | 61,07% | | |

## Appendix 2. The variables that explain the analysis of factors extracted

**Table 1:** ***The variables that explain the analysis of factors extracted for the period 2008-2013***

| Countries | Factor 1 (influence on employment) | Factor 2 (influence on GDP) |
|---|---|---|
| Austria | Agric_value added, Inflation, Govern. deficit, Freedom_trade, Size_Government, Legal system, Life_exp_birth | |
| Belgium | National_debt, FDI, Industry_value added, Size_Government, Serv_value added, Political_Stab, Govern_Effect, Reg_Quality, | Inflation |

| | | |
|---|---|---|
| | Rule_Law, Control_Corruption, Legal system, Life_exp_birth, Education_Index, Pop_educ | |
| Bulgaria | National_debt, FDI, Agric_ value added, Inflation, Services_value added, Voice_Account., Reg_Quality, Life expect., Education_Index, Pop_educ | Gover_deficit, Govern_Effect, Control_Corruption, Legal system |
| Czech Republic | Inflation, Gover_deficit, Govern_Effect | Political stability, Life expect. |
| Cyprus | National_debt, Industry_value added, Services_value added, Freedom_trade, Voice_Account., Govern_Effect, Reg_Quality, Rule_Law, Legal system, Life expect., Education_Index, Pop_educ | Agric_value added, Political stability |
| Croatia | National_debt, FDI, Industry_value added, Agric_value added, Services_value added, Freedom_trade, Voice_Account., Political stability, Rule_Law, Control_Corruption, Legal system, Life expect., Education_Index, Pop_educ | Inflation, Gover_deficit |
| Denmark | National_debt, Agric_value added, Freedom_trade, Voice_Account., Govern_Effect, Reg_Quality, Rule_Law, Legal system, Life expect., Education_Index, Pop_educ | Inflation, Size_Government, Control_Corruption |
| Finland | National_debt, Industry_value added, Agric_value added, Gover_deficit, Services_value added, Size_Government, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Life expect., Pop_educ, | Inflation |
| France | National_debt, Industry_value added, Freedom_trade, Size_Government, Voice_Account., Govern_Effect, Reg_Quality, Rule_Law, Legal system, Life expect., Education_Index, Pop_educ | FDI, Agric_value added, Inflation |
| Germany | Industry_value added, Agric_value added, Services_value added, Freedom_trade, Govern_Effect, Life expect., Education_Index, Pop_educ | |
| Greece | National_debt, Industry_value added, Agric_value added, Freedom_trade, Voice_Account., Political stability, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Legal system, Life expect., Education_Index, Pop_educ | FDI, Size_Government |
| Ireland | National_debt, Industry_value added, Services_value added, Voice_Account., Political stability, Reg_Quality, Control_Corruption, Life expect., Education_Index, Pop_educ | Gover_deficit, Freedom_trade, Legal system |
| Italy | National_debt, Industry_value added, Services_value added, Freedom_trade, Voice_Account., Govern_Effect, Reg_Quality, Life expect., Education_Index, Pop_educ | Inflation, Political stability, Rule_Law |
| Luxembourg | National_debt, Industry_value added, Freedom_trade, Gover_deficit, Services_value added, Voice_Account., Political stability, Control_Corruption, Life expect., Education_Index, Pop_educ | Agric_value added, Inflation, Govern_Effect |
| Malta | Industry_value added, Services_value added, Political stability, Rule_Law, Legal system, Life expect., Education_Index, Pop_educ | National_debt, Freedom trade, Size_Government, Voice_Account., Govern_Effect, Reg_Quality, Control_Corruption |
| The Netherlands | National_debt, FDI, Industry_value added, Services_value added, Voice_Account., Political stability, Govern_Effect, Rule_Law, Control_Corruption, Life expect., Education_Index, Pop_educ | Inflation, Gover_deficit, Size_Government, Reg_Quality |
| Poland | National_debt, Agric_value added, Inflation, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Legal system, Life expect., Education_Index, Pop_educ | Industry_value added, FDI, Size_Government, Services_value added, Political stability |
| Portugal | National_debt, FDI, Industry_value added, Voice_Account., Control_Corruption, Legal system, Life expect., Education_Index, Pop_educ | |
| Romania | National_debt, FDI, Inflation, Size_Government, Voice_Account., Govern_Effect, Rule_Law, Control_Corruption, Life expect. | Gover_deficit, Political stability, Education_Index, Pop_educ |
| Slovakia | National_debt, Industry_value added, Size_Government, Services_value added, Govern_Effect, Reg_Quality, Control_Corruption, Life expect., Education_Index, Pop_educ | Freedom_trade, Gover_deficit, Voice_Account. |
| Slovenia | National_debt, Gover_deficit, Freedom_trade, Political stability, Govern_Effect, Reg_Quality, Control_Corruption, Life expect., Pop_educ | FDI, Inflation, Services_value added, Rule_Law, Legal system |
| Spain | National_debt, Industry_value added, Services_value added, Size_Government, Voice_Account., Political stability, | FDI, Inflation, Gover_deficit |

| | | |
|---|---|---|
| | Govern_Effect, Reg_Quality, Rule_Law, Life expect., Education_Index, Pop_educ | |
| Sweden | Freedom_trade, Voice_Account., Political stability, Govern_Effect, Reg_Quality, Legal system, Life expect., Pop_educ | National_debt, Industry_value added, Agric_value added, Inflation, Gover_deficit, Services_value added, Size_Government, Rule_Law |
| Hungary | Agric_value added, Freedom_trade, Services_value added, Voice_Account., Political stability, Reg_Quality, Rule_Law, Life expect., Pop_educ | National_debt, FDI, Industry_value added |
| Countries | Factor 1 (influence on GDP) | Factor 2 (influence on employment) |
| Estonia | Agric_value added, Freedom_trade, Gover_deficit, Services_value added, Size_Government, Voice_Account., Rule_Law, Control_Corruption, Life expect., Education_Index, Pop_educ | Industry_value added, Inflation, Legal system |
| Latvia | Industry_value added, Services_value added, Freedom_trade, Voice_Account., Govern_Effect, Life expect., Pop_educ | National_debt, Agric_value added, Gover_deficit, Size_Government, Legal system |
| Lithuania | Industry_value added, Agric_value added, Gover_deficit, Services_value added, Size_Government, Education_Index | National_debt, Inflation, Freedom trade, Govern_Effect, Rule_Law, Control_Corruption, Life expect., Pop_educ |

**Table 2:** ***The variables that explain the analysis of factors extracted for the period 2013-2017***

| Countries | Factor 1 (influence on GDP) | Factor 2 (influence on employment) |
|---|---|---|
| Austria | Gover_deficit, Political stability, Life expect., Education_Index | National debt , Industry value added , Agric. value added, Inflation, Services value added , Size Government |
| Cyprus | National_debt , Size_Government , Gover_deficit, Services_value added , Voice_Account. , Govern_Effect, Rule_Law , Control_Corruption , Life expect. , Education_Index , Pop_educ | Inflation, Legal system, |
| France | National_debt , Industry_value added , Size_Government , Gover_deficit , Voice_Account. , Govern_Effect , Life expect., Pop_educ | Inflation, Reg_Quality |
| Italy | Agric_value added , Freedom trade , Gover_deficit, Political stability, Control_Corruption , Education_Index , Pop_educ | National_debt , Industry_value added , Inflation, Services_value added |
| The Netherlands | National_debt , Industry_value added , Freedom trade , Gover_deficit , Services_value added , Voice_Account., Political stability, Govern_Effect , Reg_Quality , Control_Corruption , Legal system, Life expect. , Education_Index , Pop_educ | Agric_value added , Inflation, Rule_Law |
| Romania | FDI, Industry_value added , Agric_value added , Size_Government , Services_value added , Voice_Account. , Govern_Effect , Reg_Quality , Rule_Law , Control_Corruption , Legal system, Life expect. , Education_Index , Pop_educ | Political stability |
| Portugal | National_debt , Inflation, Freedom trade , Size_Government , Services_value added , Voice_Account. , Political stability, Reg_Quality , Control_Corruption , Life expect. , Education_Index , Pop_educ | FDI, Industry_value added |
| Slovenia | Industry_value added , Size_Government , Gover_deficit , Govern_Effect , Control_Corruption, Legal system, Life expect. , Pop_educ | National_debt , Agric_value added , Inflation, Services_value added , Political stability , Reg_Quality |
| Countries | Factor 1 (influence on employment) | Factor 2 (influence on GDP ) |
| Belgium | National_debt, Industry_value added, Gover_deficit, Services_value added , Political stability, Govern_Effect, Rule_Law , Control_Corruption , Life expect. , Education_Index , Pop_educ | Freedom_trade, Size_Government |
| Bulgaria | Industry_value added , Agric_value added , Gover_deficit, Services_value added , Voice_Account. , Govern_Effect, Reg_Quality, Control_Corruption , Legal system, Education_Index , Pop_educ | Inflation, Political stability, Life expect. |
| Czech Republic | National_debt , Agric_value added , Freedom trade , Gover_deficit, Political stability , Govern_Effect , Control_Corruption , Legal system, Life expect., Education_Index , Pop_educ | FDI, Industry_value added , Inflation, Size_Government , Services_value added , Rule_Law |
| Croatia | Industry_value added , Freedom trade , Size_Government , Gover_deficit , Pop_educ | Services_value added , Voice_Account. , Govern_Effect |

| | | |
|---|---|---|
| Denmark | National_debt , Industry_value added , Size_Government , Voice_Account. , Political stability, Reg_Quality, Control_Corruption , Legal system, Life expect. , Pop_educ | Agric_value added , Inflation |
| Estonia | National_debt , Industry_value added , Agric_value added , Size_Government , Gover_deficit , Services_value added , Voice_Account. , Political stability , Govern_Effect , Legal system, Education_Index | FDI, Inflation |
| Finland | National_debt , Agric_value added , Inflation, Political stability, Govern_Effect , Life expect. , Education_Index , Pop_educ | Industry_value added , Gover_deficit , Services_value added |
| Germany | National_debt , Industry_value added , Freedom trade , Size_Government , Gover_deficit , Services_value added , Political stability, Govern_Effect , Reg_Quality , Control_Corruption , Legal system, Life expect. , Education_Index , Pop_educ | FDI, Rule_Law |
| Greece | Industry_value added , Gover_deficit, Reg_Quality, Rule_Law , Education_Index , Pop_educ | Voice_Account., Control_Corruption, Legal system |
| Ireland | National_debt, Industry_value added, Size_Government, Gover_deficit , Services_value added, Govern_Effect , Rule_Law , Legal system, Life expect. , Education_Index , Pop_educ | FDI, Inflation, Voice_Account., Reg_Quality, Control_Corruption |
| Latvia | Industry_value added , Political stability , Control_Corruption , Legal system, Life expect., Education_Index , Pop_educ | National_debt, Rule_Law |
| Lithuania | FDI, Industry_value added , Freedom trade , Size_Government , Gover_deficit, Services_value added, Voice_Account. , Rule_Law , Control_Corruption , Legal system, Life expect. , Education_Index, Pop_educ | National_debt , Inflation, Govern_Effect, Reg_Quality |
| Luxembourg | National_debt , Industry_value added , Agric_value added , Size_Government , Gover_deficit, Political stability, Govern_Effect , Legal system, Life expect. | Control_Corruption , Pop_educ |
| Malta | National_debt , FDI, Industry_value added, Agric_value added , Freedom trade , Size_Government, Gover_deficit, Services_value added , Rule_Law , Control_Corruption , Legal system, Life expect., Pop_educ | Inflation |
| Poland | Freedom trade , Size_Government , Gover_deficit , Voice_Account. , Political stability, Reg_Quality, Rule_Law , Control_Corruption , Life expect., Education_Index , Pop_educ | National_debt |
| Slovakia | National_debt , FDI, Political stability, Reg_Quality, Rule_Law, Control_Corruption | Industry_value added , Size_Government, Services_value added |
| Spain | Industry_value added , Agric_value added , Freedom trade , Size_Government , Gover_deficit , Services_value added , Voice_Account. , Political stability, Control_Corruption , Legal system, Pop_educ | National_debt , Inflation, Reg_Quality , Rule_Law |
| Sweden | FDI, Inflation, Size_Government , Gover_deficit , Voice_Account. , Political stability, Govern_Effect , Reg_Quality , Life expect. , Education_Index , Pop_educ | National_debt , Rule_Law , Legal system |
| Hungary | National_debt , Voice_Account. , Govern_Effect , Reg_Quality , Control_Corruption , Legal system, Life expect. , Pop_educ | FDI, Size_Government |

**Table 3:** ***The variables that explain the analysis of factors extracted for the period 2017-2021***

| Countries | Factor 1 (influence on employment) | Factor 2 (influence on GDP) |
|---|---|---|
| Austria | National_debt, Industry_value added, Gover_deficit, Services_value added, Voice_Account., Reg_Quality, Rule_Law, Control_Corruption, Life expect., Education_Index | National_debt, Industry_value added, Gover_deficit, Services_value added, Voice_Account. |
| Cezch Republic | National_debt, Industry_value added, Inflation, Gover_deficit, Services_value added, Voice_Account., Control_Corruption, Life expect., Education_Index, | Freedom_trade, Size_Government, Govern_Effect, Rule_Law, Legal_System, Pop_educ |
| Cyprus | National_debt, FDI, Industry_value added, Freedom_trade, Size_Government, Gover_deficit, Voice_Account., Political stability, Rule_Law, Control_Corruption, Legal_System, Education_Index, Pop_educ | Agric_value added, Inflation, Services_value added, Reg_Quality |
| Denmark | Industry_value added, Agric_value added, Inflation, Size_Government, Services_value added, Govern_Effect, Rule_Law, Control_Corruption, Legal_System, Pop_educ | National_debt, Life expect., Education_Index |
| Estonia | National_debt, Industry_value added, Freedom_trade, Gover_deficit, Services_value added Political stability, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Education_Index, Pop_educ | FDI, Inflation, Size_Government, Legal_System, Life expect. |

| | | |
|---|---|---|
| France | FDI, Inflation, Freedom_trade, Services_value added, Control_Corruption, Life expect. | National_debt, Industry_value added, Size_Government, Gover_deficit, Govern_Effect, Rule_Law, Legal_System, Education_Index, Pop_educ |
| Germany | National_debt, Industry_value added, Freedom_trade, Gover_deficit, Services_value added, Political stability, Govern_Effect, Reg_Quality, Rule_Law, Education_Index | Inflation, Size_Government, Life expect., Pop_educ |
| Greece | National_debt, Industry_value added, Freedom_trade, Size_Government, Gover_deficit, Services_value added, Voice_Account., Govern_Effect, Rule_Law, Control_Corruption, Education_Index, Pop_educ | FDI, Agric_value added, Inflation |
| Italy | National_debt, FDI, Freedom_trade, Size_Government, Gover_deficit, Voice_Account., Govern_Effect, Reg_Quality, Control_Corruption, Life expect., Education_Index, Pop_educ | Industry_value added, Inflation, Services_value added |
| Latvia | FDI, Size_Government, Political stability, Life expect. | National_debt, Industry_value added, Agric_value added, Freedom_trade, Gover_deficit, Services_value added, Voice_Account., Reg_Quality, Control_Corruption, Education_Index, Pop_educ |
| Luxembourg | Agric_value added, Inflation, Size_Government, Control_Corruption, Legal_System, Life expect., Pop_educ | National_debt, FDI, Freedom_trade, Gover_deficit, Govern_Effect |
| Malta | FDI, Industry_value added, Agric_value added, Gover_deficit, Services_value added, Freedom_trade, Political stability, Reg_Quality, Rule_Law, Control_Corruption, Education_Index, Pop_educ | Inflation, Size_Government, Govern_Effect |
| The Netherlands | Industry_value added, Agric_value added, Freedom_trade, Size_Government, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Legal_System, Education_Index, Pop_educ, Services_value added | Inflation, Voice_Account. |
| Poland | FDI, Industry_value added, Agric_value added, Inflation, Services_value added, Voice_Account., Govern_Effect, Control_Corruption, Legal_System, Life expect., Education_Index, Pop_educ | Gover_deficit, Freedom_trade, Rule_Law |
| Portugal | National_debt, FDI, Industry_value added, Agric_value added, Freedom_trade, Size_Government, Gover_deficit, Voice_Account., Political stability, Govern_Effect, Reg_Quality, Rule_Law, Control_Corruption, Life expect., Education_Index, Pop_educ | Inflation, Services_value added, Legal_System |
| Spain | National_debt, Freedom_trade, Gover_deficit, Voice_Account., Govern_Effect, Reg_Quality, Rule_Law, Life expect. | Industry_value added, Size_Government, Political stability, Legal_System, Education_Index, Pop_educ |
| Sweden | FDI, Industry_value added, Size_Government, Govern_Effect, Rule_Law, Legal_System, Life expect., Education_Index, Pop_educ | Inflation, Gover_deficit, Freedom_trade, Voice_Account., Reg_Quality, Control_Corruption |
| Hungary | Industry_value added, Agric_value added, Inflation, Gover_deficit, Services_value added, Political stability, Govern_Effect, Reg_Quality, Control_Corruption, Life expect., Education_Index, Pop_educ. | FDI, Freedom_trade |
| Countries | Factor 1 (influence on GDP) | Factor 2 (influence on employment) |
| Belgium | Inflation, Freedom_trade, Size_Government, Services_value added, Legal_System, Life expect. | FDI, Industry_value added, Gover_deficit, Voice_Account., Political stability, Govern_Effect, Reg_Quality, Control_Corruption, Education_Index, Pop_educ |
| Bulgaria | FDI, Inflation, Rule_Law | National_debt, Agric_value added, Size_Government, Political stability, Legal System, Pop_educ |
| Croatia | Industry_value added, Agric_value added, Inflation, Freedom_trade, Size_Government, Govern_Effect, Control_Corruption | Gover_deficit, Voice_Account., Legal System, Education_Index, Pop_educ |
| Ireland | Inflation, Size_Government, Voice_Account., Political stability, Rule_Law, Control_Corruption, Legal_System, Pop_educ | Gover_deficit, Services_value added |
| Lithuania | FDI, Industry_value added, Inflation, Size_Government, Gover_deficit, Political stability, Legal_System | Govern_Effect |
| Romania | National_debt, Industry_value added, Agric_value added, Gover_deficit, Services_value added, Freedom_trade, Political stability, Reg_Quality, Life expect., Education_Index, Pop_educ | FDI, Size_Government |

| | | |
|---|---|---|
| Slovakia | FDI, Freedom_trade, Services_value added, Control_Corruption | Inflation, Political stability, Govern. Effect, Legal_System, Life expect., Education_Index, Pop_educ |
| Slovenia | FDI, Industry_value added, Inflation, Freedom_trade, Size_Government, Legal_System | Reg_Quality, Rule_Law |