ISSN 2029-1701
ISSN 2335-2035 (Online)

Research Journal
PUBLIC SECURITY AND PUBLIC ORDER
2024 (36)

IMPACT OF ECONOMIC SECURITY ON ECONOMIC GROWTH IN EUROPEAN UNION COUNTRIES

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DOI: 10.13165/PSPO-24-36-05

Abstract. *Economic security is a relatively young discipline within the field of economic science, yet it plays a critical role in national security. Despite its importance, it has historically received insufficient attention from researchers. Economic security is essential for achieving economic sovereignty, fostering sustainable development, implementing effective social policies, protecting society from environmental risks, and enhancing national competitiveness in an increasingly interconnected global economy. An effective economic security system enables a country to identify threats to its national economic interests proactively, thereby preventing potential damage to the socio-economic structure. Unfortunately, in most cases a comprehensive understanding of economic security often emerges only after economic threats have materialized.*

In today's rapidly evolving world, ensuring economic security has become one of the primary priorities for nations. It serves as the cornerstone of national security and development. The dynamic nature of global developments continuously alters the risks associated with economic security, making it imperative for countries to identify and mitigate these risks promptly. The issue of economic security has gained increased attention, particularly as economies become more open and integrated into global economic processes. However, there remains no universally accepted definition of economic security within the broader context of national security. It is often conceptualized as a social phenomenon that safeguards the vital interests of individuals, society, and the state from potential dangers and threats.

Main object of an article is to analyze how economic security impacts economic growth in EU countries.

The study showed that for weak economies, a high level of GDPpC growth could be provided even with relatively low values of development indicators. At the same time, for advanced economies, high values of these indicators are a prerequisite for continued growth. Based on the model obtained in the study, it is possible to distribute countries by clusters. Such an interpretation is necessary to understand in which direction the country's economy should develop to ensure the sustainable development. Thus, the proposed method makes it possible to objectively assess the potential of the country's economic development.

Keywords: *economic security, economic growth, composite indicators, international indices, economic development, statistical analysis.*

Introduction

Economic security has emerged as a critical factor influencing economic growth, especially in the context of the European Union (EU), a region characterized by a complex

interplay of economic policies, integration processes, and diverse member state economies. In the increasingly interconnected global economy, the concept of economic security transcends traditional notions of national security and encompasses a broader spectrum of issues including financial stability, energy supply security, labor market resilience, and the integrity of critical infrastructure. These components collectively shape the economic environment, affecting both individual member states and the EU as a whole.

The European Union, as a unique political and economic union, faces distinct challenges in maintaining economic security. The diversity of its member states, in terms of economic development, resource endowments, and policy approaches, creates a multifaceted landscape where economic security can significantly impact growth trajectories. For instance, the 2008 financial crisis exposed vulnerabilities within the EU, leading to a prolonged period of economic stagnation in several member countries. Similarly, ongoing geopolitical tensions, energy dependency issues, and the COVID-19 pandemic have underscored the importance of robust economic security mechanisms to safeguard against external shocks.

Economic security in the EU context involves ensuring stable and sustainable growth through effective economic governance, crisis management frameworks, and policies that promote innovation, competitiveness, and social cohesion. These elements are crucial not only for preventing economic disruptions but also for fostering an environment conducive to long-term growth. The interdependence of EU economies means that economic security in one state can have profound implications for the entire Union, highlighting the need for coordinated policies and collective action.

This article explores the impact of economic security on economic growth within the EU, examining how various dimensions of economic security—such as financial system, innovation capability, environmental performance, etc. — affect growth outcomes. By analyzing these relationships, the study aims to provide insights into the ways in which the EU can strengthen its economic security to support sustained economic growth across its member states.

Research results

The economic growth is a complex and multifaceted phenomenon. Its analysis is based on identifying the content, qualitative and quantitative indicators, models and types of growth. Of great importance is the definition of the principles of growth of economic indicators and the economy as a whole. The category of the economic growth reflects the process of improvement over certain periods. The basic definition of the economic growth: a long-term increase in productive capacity. This concept is associated with all sectors of life and elements of social development, including its economic component. The economic growth is a category that reflects the general trends of positive or negative changes in the country's economic development. The economic growth is an important component and criterion of the economic development. It is expressed directly in the quantitative increase in GDP and its components.

The economic growth is one of the key problems of modern reality. The economic development provides new opportunities for the implementation of projects to improve the living standards of the population. For enterprises, such growth is a necessary feature of existence. Transformative processes taking place in the national economy and changes in the level of development of the country significantly affect the economic growth, which largely affects the life of the state and its future. The economic growth and economic development are not the same concept. The economic growth is considered to be an increase in the volume of production of the gross national product, and the economic development is the improvement of production and an increase in the socio-economic indicators of the country. All this creates new

questions and problems, contributes to an increase in interest in discussions related to the search for new factors and the formation of additional conditions for the economic growth. At present, for a long period, the economic growth has remained stable, despite the difficulties that countries had encountered over the past twenty years. The economic growth is possible thanks to human efforts. Human potential, acting as a productive resource within the enterprise, is embodied in the employee's ability to solve professional problems and sets the impetus for the development of production, because it is the person who is the engine and inspirer of progress. The economic growth is a constant increase in the volume of the growth of goods and services over a certain period of time. The economic growth can be compared to the evolution of the economy. Although the term evolution is not found in the works of the first economists, this definition is indirectly present in their socio-philosophical argumentation. Currently, this concept has become one of the most used in the economic theory. There are two types of the economic growth: extensive and intensive. It should be noted that in life these two types of the economic growth do not exist in their pure form, but act as a mixture in which one of the types dominates. The condition for the economic growth is a stable macroeconomic environment that promotes the attraction of new resources into economic circulation and their efficient use. The main conditions for the economic growth are: effective economic state institutions; competitive business; high aggregate demand; development of the service sector and information technology; structural shifts in the economic system. Entrepreneurs have a growing interest in increasing production capacity and improving the efficiency of their own production due to the high aggregate demand. It is important to develop science-intensive industries such as the chemical industry, the production of electrical equipment, the microbiological industry, instrument making, and the computer science industry.

The economic growth has a number of goals that need to be achieved. The main goals of the economic growth are: improving the living conditions of the population; implementation of the achievements of scientific and technological progress in practice; increasing the productive capacity of the economy; stabilization of the economic system. The drivers of the economic growth are the circumstances that govern the rate and extent of a long-term increase in a country's real output. The factors of the economic growth are often grouped by the type of the economic growth. Extensive factors are considered to be the growth of capital and labor costs, intensive factors are technological progress, the growth of the educational and professional level of workers, increase in the mobility of resources, improvement in the production management of enterprises, the necessary change in legislation in the field of the economy, that is, everything that can significantly improve the quality of production factors, so and the process of using them. The main factor of the sustainable economic growth today is the ability to compete, which is based on the innovative side of business. Thus, to ensure a balance in the interaction of economic and competition policy, it is necessary: - to apply a more flexible approach to the subjects of economic relations in antimonopoly regulation; – to develop regulatory documents with the participation of competition policy authorities. In addition, the factors of the economic growth include: natural resources of the national economy, labor (human) potential of the society, capital (fixed and circulating), the entrepreneurial ability of businessmen, scientific and technological progress and aggregate demand. With the economic growth, the country's potential should also increase: there is an increase in fixed and circulating capital, and labor force. The economic growth should be optimal, such that the incomes of all social groups in the country increase over a long period. The economic growth without the development of new high-quality production is the lot of underdeveloped countries. In order to increase the economic growth, it is necessary to observe a number of conditions: to use natural resources efficiently, because they are the basis for the country's further development, not to

waste them thoughtlessly and on unrealistic projects that can aggravate the economic situation; to use the opportunities of international economic integration, expand positions in the world sales markets, taking into account a thorough marketing analysis; to strengthen the innovative component in the socio-economic development of the country, having studied the demand for science-intensive products, to master its production; to use the state, as a market entity, to maximize the national security of the country and provide a decent working atmosphere for the development of science, production and business. To date, one of the key factors ensuring the achievement of the stable economic growth is the creation of conditions for the innovative development, which will reduce, but not eliminate the dependence of the country's economy on raw materials and open up new opportunities for modernizing the structure of the national economy, improving the quality of life of the population, and reducing income differentiation in the society and, accordingly, the allocation of a large percentage of the middle class.

Economic security and economic growth are fundamental objectives for countries worldwide, representing key drivers of long-term prosperity, societal well-being, and global competitiveness. Achieving and maintaining economic security is essential for withstanding shocks and uncertainties, ensuring stability, and fostering sustainable development. Economic growth, on the other hand, is the cornerstone of progress, signifying the ability of a country to increase its production, generate wealth, and improve living standards over time. Based on empirical data, theoretical foundations and international comparisons, the author aims to provide a comprehensive analysis of indicators that underlie economic security and economic growth. By understanding these indicators and their interaction, it will be possible to formulate an effective model for assessing the impact of economic security on economic growth. As it was mentioned before, there is no single definition of the economic security and economic growth of a country which scientists use. The essence of these two concepts is complicated and multifaceted.

According to Makštutis (2006), economic security refers to a state in which economic and governmental institutions are structured in a way that safeguards the nation’s key interests. This state ensures that the country’s development is balanced and socially oriented while maintaining robust economic and defense capabilities, regardless of whether domestic or international events are favorable or unfavorable.

Markevicius (2011) asserts that economic security and national welfare should always be top priorities for governments, as well as for political and national leaders. He identifies three distinct contexts for national security: philosophically, security should be regarded as a universal value; politically, it involves creating policies and tools to protect and uphold this value; economically, it focuses on the well-being of the population and the development of strategies to enhance this well-being.

Cernius (2019) describes investment security as a condition in which both private and public enterprises play a regulatory role in investment activities and actively participate in the investment process. Daujotas (2015) highlights that foreign direct investment is a crucial source of capital for developing nations, supplying essential resources for infrastructure, technological advancement, and the enhancement of economic capacity. Quinn and Cahill (2016) suggest that scientific and technological security is vital for ensuring adequate social, economic, and political stability within a society. Carter (2011) thinks that the food security is one of the main objectives of the economic policy. Access to safe, nutritious and affordable food is strongly related to socioeconomic factors. According to Malnar (Malnar and Malnar, 2015) the demographic development is a decisive factor in modern security studies, and demographic factors can be signs of a security situation and possible change.

The author thinks that choosing the right sub-indicator system is the key to obtaining an objective assessment of it. This scorecard should consider all threats to the economic security. All indicators used must be independent, comparable and representative. The author proposes to base the assessment of the level of the economic security of the country on a hierarchically constructed system of indicators, which includes the compiled indicator formed on the basis of sub-indicators grouped by components. As described earlier, the formation of a system of subindicators for assessing the economic security of a country should be carried out in accordance with the principles of representativeness, reliability and availability of information.

During determining the indicators of the economic security, the subjective position of the researcher, the priority of identified interests, threats, indicators and their threshold levels should be taken into account. To assess the economic security, it was proposed to use the following groups of indicators (Figure 1).

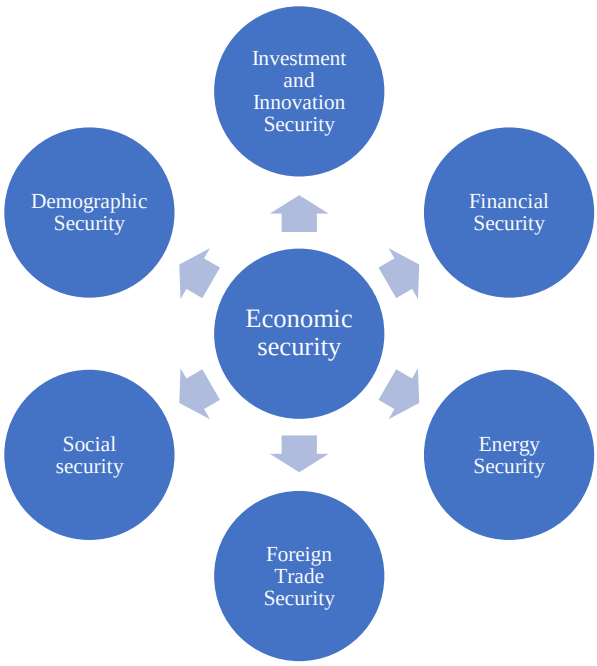

Figure 1. Main indicators of economic security
(Source: created by author based on previous researches)

In order to form a system of indicators for assessing the level of the economic security of a country, the author analyzed the composition of the subindicators used by well-known international indices and ratings. Based on the analysis of literary sources (Gryshova et. al., 2020), it is established that in the most well-known and widely accepted indicators in world theory and practice measurement and comparative analysis are: Global Competitiveness Index; Index of Economic Freedom; Fragile states index; Globalization Index KOF; Human Development Index; Worldwide happiness; Doing business; Democracy index; Corruption Perceptions Index; Prosperity Index Legatum and the Environmental Performance Index. The author examined their compliance with the above principles and the main threats to the economic security, as well as the elimination of the same indicators. As a result, those sub-indicators were selected that clearly characterize individual components of the country's economic security. The selected indicators were checked for the absence of multicollinearity. To avoid an increased effect in calculating the compiled indicator of the country's economic security, the correlation analysis will be used to check the density of statistical relationships

between numerical series for the selected indicators, which could be used to assess the country's economic security. According to Denysov (Denysov, 2016), criteria of the economic security determine the qualitative position, which, in turn, forms a strategy of deterrence and counteraction to danger. The use of an objective system of criteria, parameters, indicators and thresholds makes it possible to properly identify the magnitude of real and potential threats. The threshold level is a certain numerical expression of the quantitative and qualitative characteristics of the state of economic security of the subject, which characterizes their maximum allowable values. In turn, non-compliance with these values harms the process of the normal development of various elements of reproduction and, as a consequence, leads to the consolidation of destructive trends in the economy. The composition of the selected sub-indicators made it possible to distribute them by components: economic, political, social and environmental.

To find out how the economic security impacts the economic growth of a country the main indicator of the economic growth should be found. According to Kiseľáková (Kiseľáková et.al., 2018) the World Economic Forum (WEF) defines the economic growth as "the set of institutions, policies and factors that determine the level of productivity of the country". The productivity of a country means a country's ability to maintain a high level of income, but it is also one of the main factors influencing the return on the investment that reflects the growth potential of the specific economy. In summary, the economic growth is understood as the ability of the country to achieve sustained high growth rates of GDP per capita.

In the author's opinion, the economic growth of a country is the ability of the economy of one country to compete with the economies of other countries in terms of the effective use of national resources, increasing the productivity of the national economy and ensuring, on this basis, a high and constantly growing standard of living for the citizens of a state. When choosing dependent variables, the author will proceed from the fact that the main economic indicators of the country's development are in one way or another related to the volume of the gross domestic product (GDP). Usually, such indicators as the total GDP and GDP per capita are distinguished. At the same time, the use of absolute indicators in a generalizing study is inappropriate, since they can differ significantly in different countries.

Thus, as the main dependent variables, the author chose the indicators of the relative GDP growth and relative growth of the GDP per capita. In addition, as studies show (Ludvigson et al, 2020), macroeconomic processes are rather slow and inertial. Therefore, the results in the form of changes in the GDP growth rates may appear with some delay. Therefore, it is necessary to include in the dataset the output variables taken with a lag in relation to the input ones.

Authors think that choosing the right sub-indicator system is the key to obtaining an objective assessment of it. This scorecard should consider all threats to economic security. All indicators used must be independent, comparable and representative. Authors propose to base the assessment of the level of economic security of the country on a hierarchically constructed system of indicators, which includes a compiled indicator formed on the basis of sub-indicators grouped by components. As described earlier, the formation of a system of subindicators for assessing the economic security of a country should be carried out in accordance with the principles of representativeness, reliability and availability of information.

It is obvious that the countries analyzed in the work differ significantly from each other. Even a cursory analysis of the array of input data shows significant differences both in indicators of economic development (including specific ones) and in the analyzed factors. At the same time, as a rule, in the behavior of individual objects of research, regularities can be identified that make it possible to combine their groups for joint study and building generalizing conclusions.

Therefore, in addition to the obvious use of the constructed models for predicting economic development indicators (changes in the value of GDP and its share per capita), it is also advisable to consider the possibility of clustering individual countries into groups that unite countries that are closest in terms of their development characteristics.

To solve the clustering problem, a fairly large number of methods have been developed, including both statistical ones, which differ favorably in operating speed, and intelligent ones, built on the basis of neural networks and characterized by the ability to find nonlinear relationships in data. Let's consider how these algorithms work.

When solving applied problems of analysis, the formation of feature descriptions of objects is a more complex operation than determining the measure of their similarity. As an example, we can compare several photographs, when it is easier to conclude that they depict the same object than to determine the array of features on the basis of which such a decision was made. Thus, the task of classifying objects based on their similarity to each other, when the belonging of training objects to any classes is not specified, is called the clustering problem. In other words, clustering is the task of dividing a set of objects into groups according to the criterion of their similarity. Within each of the obtained groups there are similar objects, and the objects of different groups are most different from each other. The effectiveness of solving the formulated clustering problem is difficult to assess due to the lack of an objective criterion for assessing the quality of the results obtained. In addition, the specifics of the work of one or another clustering algorithm involves entering a certain set of input parameters before starting the analysis. One of the most common parameters is the number of clusters into which the initial array of objects of the analysis being analyzed should be divided. The goals of applying clustering algorithms to data can be divided into two large groups: 1. Using clustering as an intermediate step in data processing. Clustering due to its relative ease of use is often used in exploratory analysis to initially determine the structure of the analyzed array and apply more complex algorithms to the resulting groups or form a secondary array of objects that have average characteristics for each cluster to reduce the amount of stored data. 2. Using clustering to solve the problems of detecting anomalous objects. In this case, it is assumed that the anomalous object will not belong to any of the clusters, however, such output marking options are possible for a limited number of clustering algorithms. It should be noted that for this case of their application, it is possible to evaluate the effectiveness of the algorithms. Classification of clustering algorithms can be carried out according to different criteria that characterize both the nature of the partition (hierarchical and flat) and the belonging of objects (clear and fuzzy) to clusters. Evaluation of the efficiency of clustering algorithms is subjective and may vary for different data sets, however, the quality of their work in solving applied problems determines their popularity and the need to include software implementations in open libraries of data mining algorithms.

After researching methods of clustering, authors propose the use of manual clustering when it is needed to build a visual display of data using a scatter plot. Since the diagram is plotted using one parameter, only the vertical position of the points matters, and the horizontal difference serves only to separate countries closely located on the diagram. Next authors constructed a similar diagram for two parameters - avg and avg_ which allows you to clarify the picture of the distribution of countries into clusters.

Thus, the proposed method makes it possible to objectively assess the potential of the country's economic development. Let us also consider the results of applying the formal method of data clustering using the k-means and g-means algorithms. The algorithm will be running on input data with various settings that govern the clustering process.

After above actions are done the relationships between clusters can be graphically displayed. It illustrates the location of links between clusters, that is, the degree of their "similarity" to each other. These data can be used to analyze the possible directions of development of countries in the transition from cluster to cluster.

Authors are interested in constructing an economic interpretation of the adjustment factors for dummy variables. Such an interpretation is necessary to understand in which direction the country's economy should develop to ensure sustainable development. Based on the principle of operation of the panel regression model with fixed effects, the coefficients for dummy variables show how much it is necessary to correct (increase or decrease) the result of model calculations for each object under study. Thus, it can be hypothesized that the adjustment coefficient shows the effectiveness of the country's economic development. The larger this coefficient, the less efforts the country needs to make to achieve high growth rates of per capita income. Author should plot the average GDPpC and cluster number for each country. A similar result is also obtained if the average values of the correction factors are plotted instead of the cluster numbers.

It was noted above that the panel regression model with fixed effects showed the best result among statistical models. In this model, for each object, the value of unobservable individual effects is calculated, for which the method for determining the regression coefficients is corrected. Thus, for each country, the model forms its own adjustment coefficient, which serves to compensate for its individual characteristics.

This adjustment factor can be viewed as a generalized indicator of the individual characteristics of a country and used as the main indicator for grouping countries. According to methodology, the construction of a diagram for two parameters – avg for models describing relationships in the current period and avg_ for models describing relationships in the future allows to clarify the picture of the distribution of countries into clusters (Figure 2).

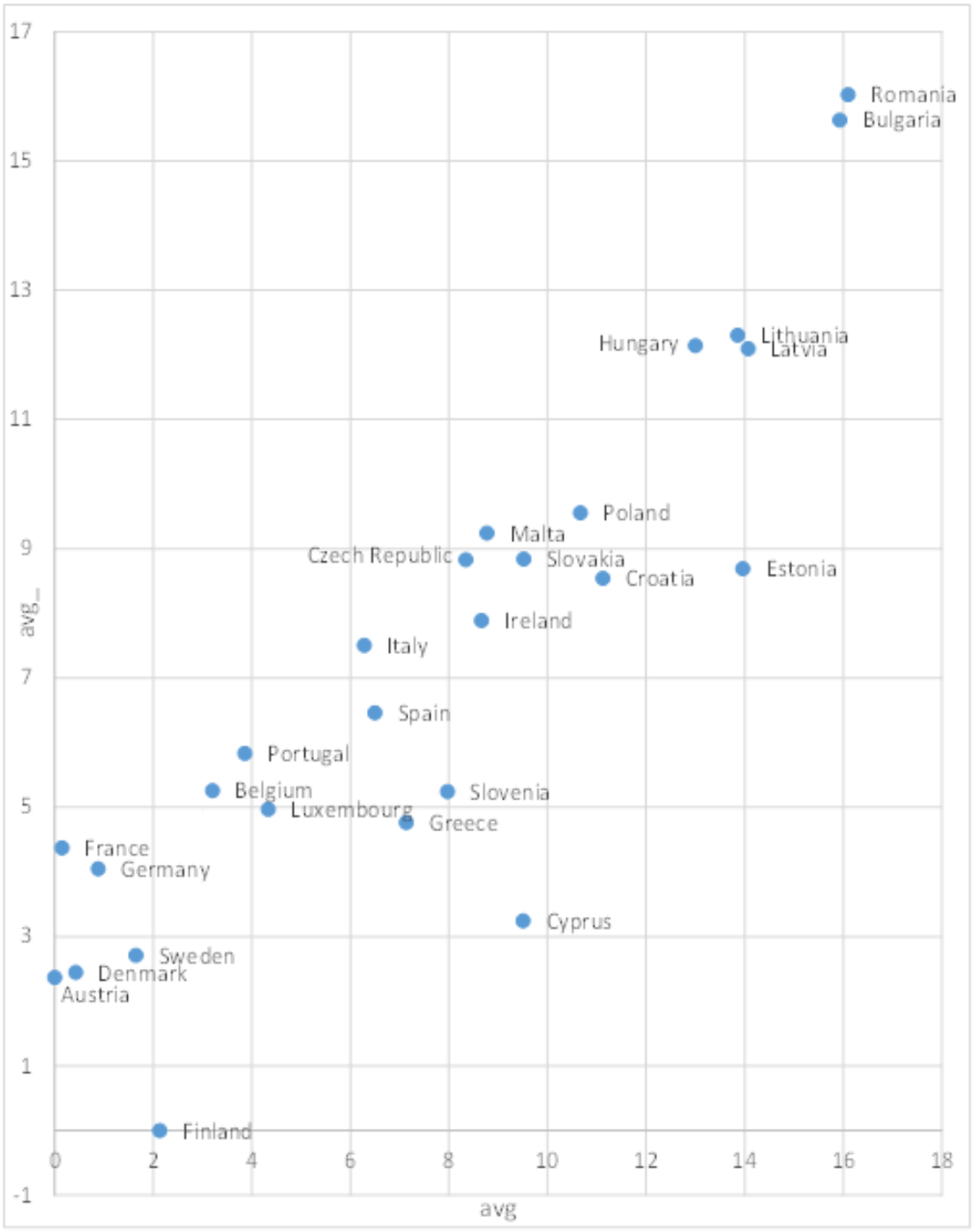

Figure 2. Distribution diagram of countries based on avg и avg_.
Source: Authors` own calculations

Obviously, this distribution is not random. The analysis shows that countries that are close economically, and often also geographically, fall into one group. At the same time, there is a tendency that the countries with the most developed economies are closer to the base of the coordinate plane, and the countries with a weakened or developing economy are the most distant from it. According to methodology, the algorithm was run on input data with various settings that govern the clustering process (Table 1).

Table 1. Results of clustering data by country

COL1	Cluster number	Distance to cluster center	Average cluster distance
Finland	6	0	0
Sweden	5	0,07374	0,0672
Netherlands	5	0,087706	
Germany	5	0,073136	
France	5	0,090842	
Denmark	5	0,031469	
Austria	5	0,046426	
Portugal	4	0,049002	0,0482
Luxembourg	4	0,054576	
Belgium	4	0,01689	
Spain	3	0,123557	0,084
Slovenia	3	0,023043	
Greece	3	0,040557	
Cyprus	3	0,149035	
Slovakia	2	0,077127	0,0671
Malta	2	0,056134	
Italy	2	0,137686	
Ireland	2	0,041509	
Czech Republic	2	0,023099	
Poland	1	0,093547	0,1192
Hungary	1	0,158377	
Estonia	1	0,126342	
Croatia	1	0,098706	
Romania	0	0,1426	0,1295
Lithuania	0	0,127084	
Latvia	0	0,132298	
Bulgaria	0	0,116193	

Source: Authors` own calculations

It can also be noted that the algorithm placed Romania, Bulgaria and Lithuania, Latvia in one cluster (№ 0), although visually they are quite far from each other. It can be concluded that in this case the limitations of the automatic algorithm appear. Note that this cluster is characterized by the largest average distance from the elements to the center, that is, it is the first candidate for additional division.

The relationships between clusters can be graphically displayed as follows:

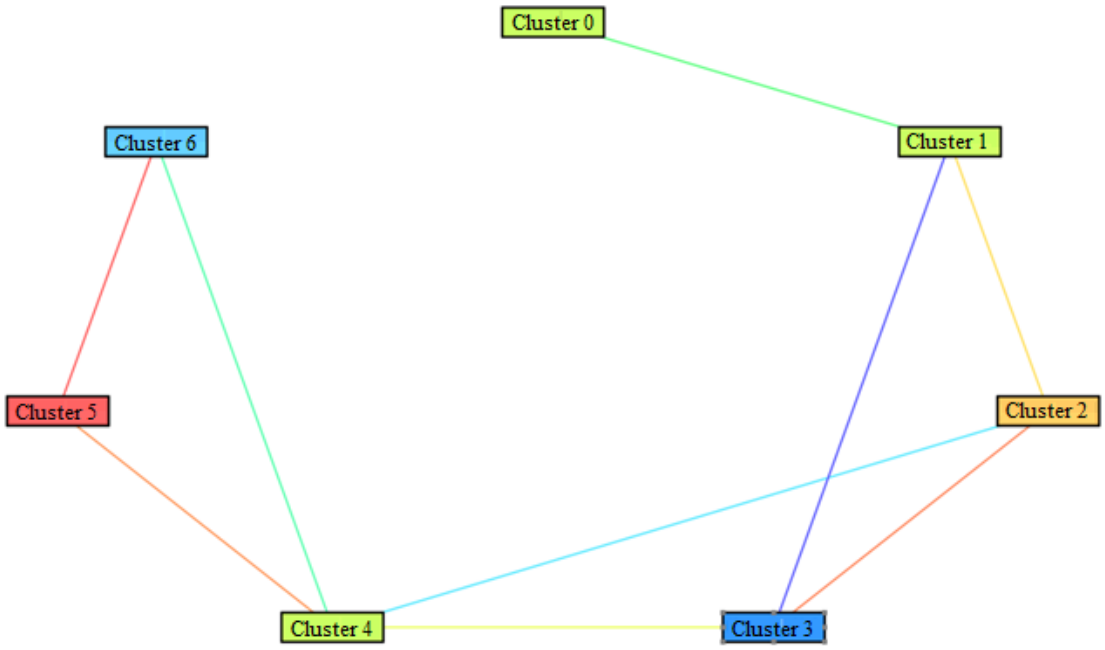

Figure 3. Cluster connections
Source: Authors` own calculations

Figure 3 illustrates the location of links between clusters, that is, the degree of their "similarity" to each other. These data can be used to analyze the possible directions of development of countries in the transition from cluster to cluster.

Conclusions

During research theoretical basses of economic security and economic growth of were analyzed. Main concepts of economic security of the country and economic growth were determined. The study statistically proved the existence of a relationship between the country's economic growth, expressed through indicators of the dynamics of GDP per capita, and the factors of economic security, which are represented by a system of indicators of economic, political, social and environmental development. The analysis showed the correspondence between the calculated and empirical values of economic growth.

Based on the model obtained in the study, it is possible to distribute countries by clusters. Such an interpretation is necessary to understand in which direction the country's economy should develop to ensure sustainable development. Thus, the proposed method makes it possible to objectively assess the potential of the country's economic development.

Further researches will be aimed at identifying closer relationships between economic and non-economic indicators and their impact on economic growth and economic security of the EU countries. Due to the lack of researches in this field, author believes that such studies and modelling can bring unexpected results.

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