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Analysis of the Eurozone's Resilience to Crises and Disturbances in the Context of EU Development Strategies—Contemporary Approach Using Anfis

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Abstract: In the context of the capability of economies to adapt their strategies in response to changing economic circumstances, this paper examines the resilience to crises and disturbances of Eurozone member countries in accordance with the priorities and strategies of the European Commission for development. Given that significant discrepancies were noted in the success of the growth of developed economies in the years after the last financial crisis, i.e., the resilience of economies to recover from the crisis, 25 variables of interest were selected for analysis in accordance with the European development guidelines. The selected variables have been classified into clusters using a dendrogram, and the set of variables in the formed clusters were then analyzed using the Adaptive neuro-fuzzy inference system (ANFIS). The conducted analysis highlighted the importance of parameters such as energy imports dependency, real GDP per capita, share of trade with the EU27, gross domestic expenditure on R&D and trade volume indices, and they served as output variables in the observed models. While based on the previously performed clusters, these other parameters have been classified into clusters of prominent variables of importance. The conducted analysis can be used to determine investment priorities in terms of strengthening the resilience of the Eurozone.

Keywords: resilience; economic disturbances; crisis; Eurozone; EU development strategies

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1. Introduction

In the research of different authors, it can be concluded that resilience is the ability to avoid (anticipate), withstand (absorb), adapt to (reconfigure), recover from (restore) [1]. It can also be defined as the ability of organizations to withstand disruptions, reliability when recovering from disruptions, redundancy when managing predictable volatilities, and flexibility when adapting to extreme circumstance [2,3].

Resilience to crises and disruptions has traditionally been measured by GDP (growth and GDP per capita) and employment in a particular region [4], so it can be concluded that in the context of developing resilience it is important to observe factors that affect the increase in GDP and the increase in GDP per capita in certain regions.

On the other hand, when observing competitiveness in the context of resilience, it is necessary to not only understand the combination of factors that reduce the vulnerability of the territory and the production system, but also to identify strategies for increasing the financing of recognized factors that are crucial to economic growth. Austerity policies in the context of reducing public debt hinder the development of the local economy, especially the underdeveloped ones. It is therefore necessary to create possibilities capable of reacting to economic shocks, which depend on the size of the company and the degree of innovation, openness, propensity to export, industrial relations, and network systems [5].

Likewise, the results of the previous research show that the key to success for regional policies is the engagement of resources for research and development in regions that are strongly affected by the crisis [6]. The above does not only refer to the need to develop

resources and support research and development after identifying the crisis and the disruption, but should serve as a tool to strengthen resilience against the onset of crises and their consequences. Namely, according to the document of the European Commission "European Semester Thematic Factsheet Research and Innovation" [7], research and innovation play an important role in stimulating smart and sustainable growth and creating jobs. Since it contributes to the creation of new knowledge, research is crucial for the development of new and innovative products, processes, and services that enable greater productivity, industrial competitiveness, and, ultimately, well-being.

Past experiences have also shown that regional responses to crisis situations causing economic disruptions differ regarding the nature of the external disruption and regional characteristics prior to the shock. Capital-intensive regions are less resilient than labour-intensive regions. Capital mobility initially causes moderate negative effects on GDP, while the situation worsens in later stages, which affects the slower recovery of regions and reduces their resilience. Labour mobility depends crucially on the nature of the shock [8].

Defining resilience is challenging because the concept can refer to different aspects. Therefore, the scientific research continues to pose questions such as whether resilience implies that certain regions are not affected by an economic shock at all, the ability to quickly go back to original state before economic shocks, or to adapt and grow faster after a particular shock [9].

In addition to the above, it is necessary to consider and separate the shocks from the changes that are constantly happening in the economy. The political perspective links resilience to vulnerability, prevention and mitigation, and recovery. Rose's [10,11] definition of economic resilience is a useful starting point for empirical research, and defines economic resilience as the ability to reduce losses from shocks. Rose distinguishes between static economic resilience (the ability to maintain functioning without repair and reconstruction) and dynamic economic resilience, which is the speed of recovery after a shock and bringing back some desired state of affairs.

There are three main types of resilience to crises and economic shocks: adaptive, engineering and environmental resilience. Adaptive resilience is a standard resilience that stands for adaptability and rapid economic recovery. A region can be classified as resilient, in the sense of so-called "adaptive" resilience, if it has the ability to reconfigure, i.e., adapt its structure (firms, industries, technologies, and institutions) and, in this context, to maintain an acceptable way of employment growth, production, or wealth over time. Regions with a sectoral structure and location advantage, or those with location advantages in the post-crisis period (according to the adaptive type of resilience) show a significantly smaller decline in the growth of economic indicators. It should be noted that the probability of better behaviour (smaller decline than average) is recorded in regions specialised in the service sector, while after the last economic crisis, the biggest decline was recorded in the construction sector [12].

It is possible to increase resilience before a shock occurs by investing in education, training, and reducing vulnerability (for example stockpiling and structural reforms) [13].

Regions characterised as innovative had better resilience and faster recovery within three years after the last economic crisis. Innovation builds resilience and a dynamic economy. For economies to have the ability to respond to shocks and the ability to resist or recover, policies should promote the ability to work, use, and interact. Resilient economies have agile innovation systems that promote new combinations of activities where organisations are willing to accept risks, and adaptability is embedded in the behaviour and responses of key players in the region. The more choices available at the time of the shock, the more likely it is that one of these choices will provide a positive and effective path through the crisis and a new path out of it. Innovation is therefore a way of thinking and the ability, as well as the result, of solid performance because innovative regions show a positive attitude towards dynamics and the need for change [14].

In addition to innovation, the influence of international trade as a variable in the assessment of resilience should also be examined. In their research, Van den Berg and

Jaarsma [15] show that the characteristics of an individual company are the most significant variables in resilience both in front of trade and forex trading.

Accordingly, policies to strengthen resilience should be selective and focused on certain sectors, products, or stages in the value chain.

The recent global recession and resulting slow recovery have revealed significant heterogeneity in economic performance across countries and regions [16].

At the regional level, Martin identifies four main dimensions of resilience:

i. sensitivity of regional production and employment to exogenous shocks determines the demand for public policies;
ii. recovery in terms of speed of rebound after a negative shock;
iii. reorientation, which analyses the extent to which the region changes after the shock by changing, for example, the sectoral composition; and
iv. recovery, which represents the ability of the regional economy to re-establish its growth path.

The economic decline after the last economic crisis highlighted the weaknesses of certain regions, i.e., their economies, with regard to international shocks, but also their ability to adapt quickly [17–19].

The answer should be sought in complex adaptive systems (CAS) as a new conceptual way of thinking. The greatest value of such systems is manifested in co-evolutionary patterns of action in crisis situations, i.e., companies, employees, and policy makers must develop high-quality co-evolutionary responses in detecting potential crisis and consequences and achieve formal and informal forms of dialogue based on the experience of past crises and political experiments [20].

The economic crisis that began in 2008 had far-reaching consequences, including effects on the innovative behaviour of companies. Many companies have scaled back their innovation activities, although some companies have been more resilient than others. It is therefore necessary to investigate the probability of whether companies will engage in internal research and development during the crisis, under what conditions, and their relationship with regional and political factors. There is a consensus among economists and policy makers that economic growth is largely conditioned by the capacity of firms to innovate. By determining the extent of research and development expenditures within an individual company during the crisis, it is possible to indirectly predict the recovery of regional and national economies [6].

Addressing shocks after they occur, or minimising the likelihood of their occurrence through preventive action, is vital to achieving long-term growth and development. External economic shocks usually have very large negative effects on the development and growth of economies, investment, and poverty. When a developing country is hit by an external shock, its balance of payments, fiscal accounts, and overall level of economic activity suffer [21].

With regard to employability, experiences point to the fact that resilience to economic shocks in terms of employability is significantly greater in, for example, Germany and France than in other EU economies, and that highly educated middle-aged residents and men are more resilient [22]. Likewise, regions with diversified economies are less sensitive to employment fluctuations and economic contractions [23–25].

Small companies have shown greater resilience in terms of employment growth, which proves that they are more flexible and able to adapt to new conditions. A change in the sectoral structure, i.e., a transition from one business sector to another, is effective for the renewal and growth of employment (elasticity). Innovation plays a major role in creating resilience [26].

Agriculture is extremely resistant to economic shocks and is an extremely important food industry, which also recorded an increase in employment during the crisis years. The tourism sector recorded a decline during the crisis years, and shows greater resilience in island regions than in continental regions [27].

Agriculture is a branch that has proven to have an impact on the ability of mixed and rural regions to quickly recover and on local work systems. Therefore, in the context of resilience, increased agricultural support for modernisation and education is necessary to increase the productivity and economic performance of European agriculture. Production is negatively related to the resilience of urban regions, and the vulnerability of the production sector in times of crisis is emphasised. The same applies to the construction sector [28].

ICT-intensive companies are more resistant, or less affected, by economic shocks in terms of productivity. This also applies to other service industries. ICT-intensive companies are more successful in introducing process innovations in periods of shocks [29].

The research conducted in Spain after the last economic crisis shows that the sectors of energy, production, construction, finance, and other activities in the tertiary sector had reduced resilience to crises, while specialised activities in distribution, transport, agriculture, and shared services increased availability and influenced the quick restoration to conditions before the shock, that is, they are superiorly resistant to crisis situations [30].

According to Đokić et al. [31], construction activities and trade openness are the most important determinants of regional resilience, so they should be adapted or put into function as specialised activities.

The most resilient regions have previously been specialised in dynamic and productive industries such as energy, certain forms of production, and advanced market services [32].

Regions with higher employment and shares in sectors that are less sensitive to fluctuations will experience higher growth rates after the crisis, and be more resilient to economic downturns. Long-term trends and shifts in regional economies, as well as in their industrial structures, are crucial to the development of regional resilience and recovery from recession [33].

Although cities are generators of financial activity, they are often hit hard during crises. However, a high quantity of territorial capital is expressed by a high degree of physical availability, access to information, and knowledge, the generation of cross-sectoral productivity growth and the ability to adapt to a crisis. Therefore, cities play a major role in the resilience of regions if they possess the quality of production factors, the density of external connections, the network of cooperation, and the quality of urban infrastructure [34].

A larger share of the older population in the total population is negatively associated with resilience, and has a negative impact on labour productivity growth patterns (GDP per capita). A larger share of the population aged 55–64 shows greater resilience to crises and disruptions, while the negative impact of the last economic crisis in the EU was also recorded in a larger share of the population aged 15–24 [28]. In this regard, and considering the disruptions that arise in health crises such as the latest one caused by COVID-19, the size of health expenditures could also be an indicator of resilience, but only to the extent that they are directed towards the prevention of age-related diseases. With this pandemic, as in many studies after the last economic crisis, it has been shown that for resilience it is important to observe the degree of development and connectivity, employment in the service sector, and the degree of urbanisation. Namely, these are precisely the factors that influenced the lower resilience [35].

Migrations have the greatest positive effect on the resilience of urban, mixed, and rural areas. They are especially significant in rural areas. Ghosh and Mastromarco [36] found that the total factor productivity of US states was positively associated with the inflow of skilled immigrants. This positive connection is also evident with the level of economic development in urban and rural areas.

Public policies that improve productive and social capital play an important role in building resilience [37].

Policymakers can do important things to prepare their regions for shocks and support resilient economies. However, these efforts cannot start after a crisis, but must be sustained over time. Policies to prepare regions for competition in normal times, such as policies to help establish agile innovation systems or policies that deal with human capital and the structure of regional territorial capital, are also useful in preparing to face a crisis [38].

Policies that may be good for resilience may face trade-offs that will affect growth in the long run. For example, higher capital requirements for banks can improve their depreciation capacity. However, after a certain point this can inhibit growth by limiting the available funds for borrowing [39].

Reduced rates of national co-financing for member states facing financial difficulties can be increased by the rate of absorption of money from EU regional development programmes [40]. In creating value and economic growth, entrepreneurs should be less dependent on the public sector and focus on entrepreneurial and participatory management [41].

In the presented previous research, a gap was observed in research related to specific parameters and their interdependence regarding the ability of economies to adapt their strategies in response to economic circumstances that change from time to time. This observed gap was the motive for this research. The main research question is therefore: Which parameters are suitable for observation, considering the currently set EU strategies, and what is their interdependence in the context of resistance to crises and disruptions? In connection with the above, the following question arises: In what way should such parameters be identified and tracked?

Section 2 presents the data used in the research as well as the methodology. Section 3 covers the results of the observed Eurozone countries and a discussion followed by Section 4 and the conclusion.

2. Data and Methodology

The data for analysis shown in Table 1 refer to the period from 2016 to 2020 and were collected from the Eurostat portal (https://ec.europa.eu/eurostat/web/main/data/database) (accessed on 20 February 2022).

For the purposes of analyses in this paper, the data shown in Appendix A Table A1 are standardised. Standardisation replaces the values by their Z scores in order to ensure consistency, i.e., have the same content and format, and to make data tracking easy to compare.

This redistributes the features with their mean.

mu = 0 and standard deviation sigma = 1

x_standardized = (x − mean (x))/std (x).

For the purpose of clustering, a dendrogram was made with the aim of determining the variables of a particular model for further analysis and determining the hierarchical relationship between the observed variables.

The increasing application in solving problems with classification and pattern recognition points to the fact that such tools have proven to be very good at solving various types of problems in which the connection of variables is examined, regardless of the degree of complexity of that connection. Related to classification problems, i.e., data clustering, various tools have been developed that solve data grouping problems.

Data clustering represents the process of grouping them into appropriate groups, so-called clusters, according to their similarity, i.e., according to some of their properties. Clustering is distinct if each sample belongs to one and only one cluster. In other words, in this case it is a partition of the set of all samples.

A dendogram is a frequently used tool that has proven to be extremely effective in solving economic problems. Therefore, for the purpose of grouping into clusters and diagnosis of connections, it was selected in this research.

Table 1. Name of the variables for the analysis of the resilience of the Eurozone to crises and disturbances.

No.	Name of the Variable to be Analysed
1	Real GDP per capita
2	Unemployment rates
3	Population by educational attainment level
4	HRST by category, sex and age
5	GERD by sector of performance
6	Enterprises that employ ICT specialists
7	Enterprises that provided training to develop/upgrade ICT skills of their personnel
8	Digital inclusion—individuals
9	Exports of goods and services in % of GDP
10	Imports of goods and services in % of GDP
11	Early leavers from education and training by sex
12	People at risk of poverty or social exclusion
13	Self-reported unmet needs for medical examination
14	Inability to face unexpected financial expenses
15	Arrears (mortgage or rent, utility bills or hire purchase)
16	Energy efficiency
17	Energy imports dependency
18	Share of fossil fuels in gross available energy
19	Employment in technology and knowledge-intensive sectors
20	Harmonised Indices of Consumer Prices (HICPs)all items—annual average indices
21	Trade volume indices, by reporting country
22	Share of trade with the EU27
23	Gross domestic expenditure on R&D by sector
24	High-speed internet coverage
25	Resource productivity and domestic material consumption

The analysis of the relationship of selected closely related variables was done through Adaptive Neuro-Fuzzy Inference System (ANFIS), because these tools are frequently used as a universal approximator in modelling nonlinear functions of multiple variables, but also in predicting chaotic time series, in order to ensure the stability of processes, accurate identification, in machining dynamics analysis, high accuracy in comparison to the other approaches, etc. [42–47] using the Matlab software package, through 5 separate models of characteristics as follows:

Model 1 is presented in Figure 1:

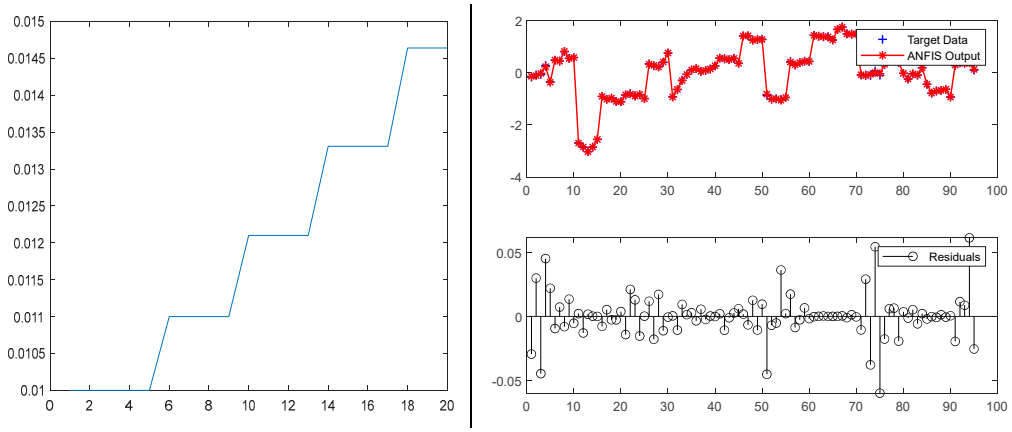

Figure 1. Model 1 features presentation.

ANFIS info:

- Number of nodes: 193
- Number of linear parameters: 405
- Number of nonlinear parameters: 36
- Total number of parameters: 441
- Number of training data pairs: 95
- Number of checking data pairs: 0
- Number of fuzzy rules: 81
- Minimal training RMSE = 0.017338

Model 2 is presented in Figure 2:

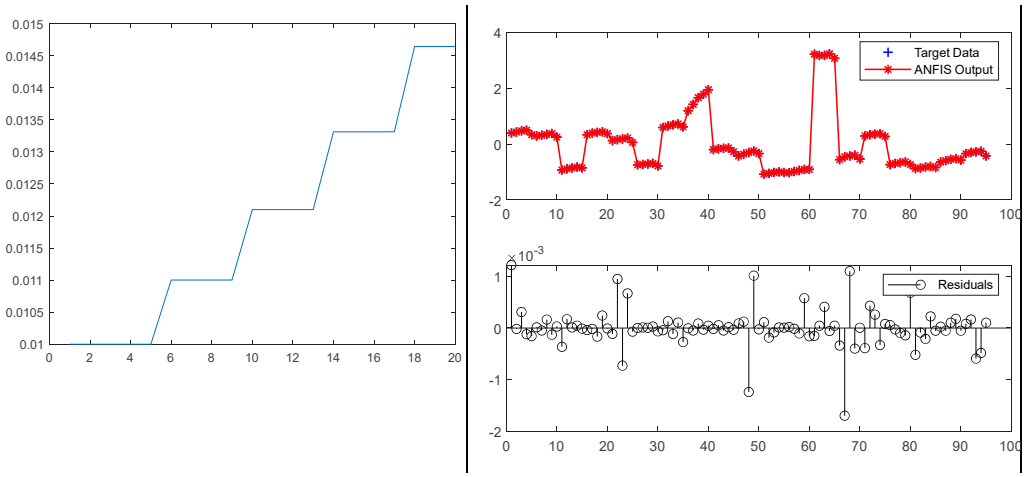

Figure 2. Model 2 features presentation.

ANFIS info:

- Number of nodes: 193
- Number of linear parameters: 405
- Number of nonlinear parameters: 36
- Total number of parameters: 441
- Number of training data pairs: 95
- Number of checking data pairs: 0
- Number of fuzzy rules: 81
- Minimal training RMSE = 0.00037804

Model 3 is presented in Figure 3:

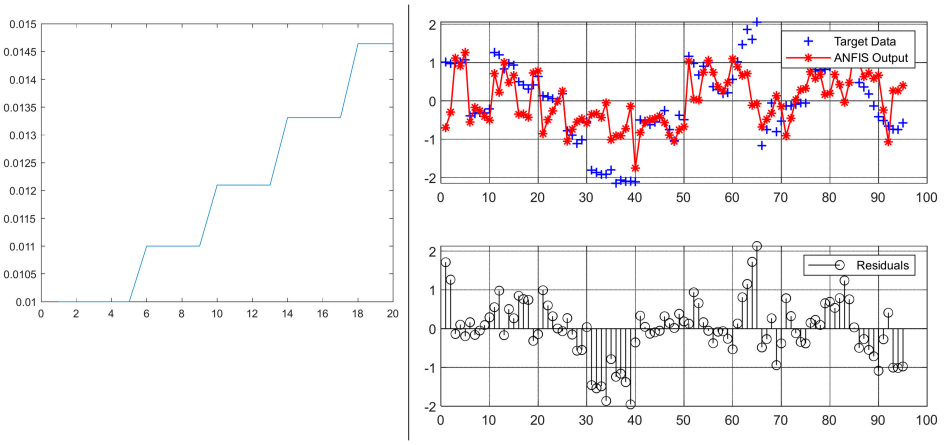

Figure 3. Model 3 features presentation.

ANFIS info:

- Number of nodes: 35
- Number of linear parameters: 27
- Number of nonlinear parameters: 18
- Total number of parameters: 45
- Number of training data pairs: 95
- Number of checking data pairs: 0
- Number of fuzzy rules: 9
- Minimal training RMSE = 0.752461

Model 4 is presented in Figure 4:

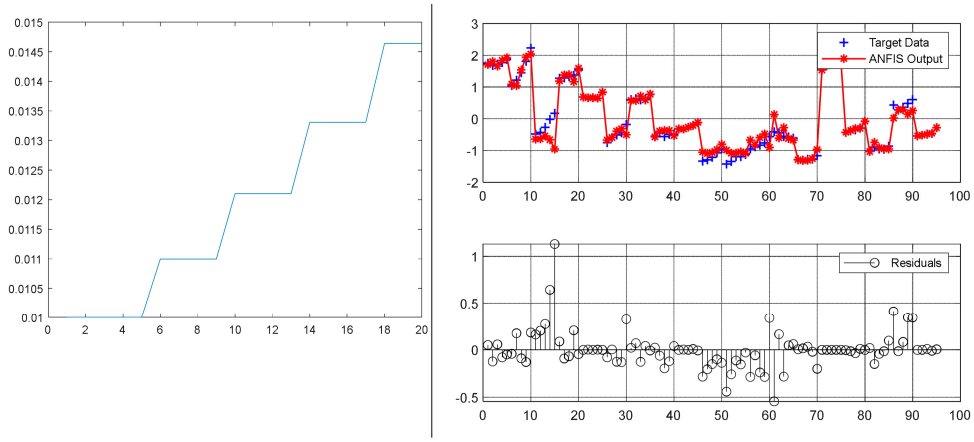

Figure 4. Model 4 features presentation.

ANFIS info:

- Number of nodes: 193
- Number of linear parameters: 405
- Number of nonlinear parameters: 36
- Total number of parameters: 441
- Number of training data pairs: 95
- Number of checking data pairs: 0
- Number of fuzzy rules: 81
- Minimal training RMSE = 0.20408

Model 5 is presented in Figure 5:

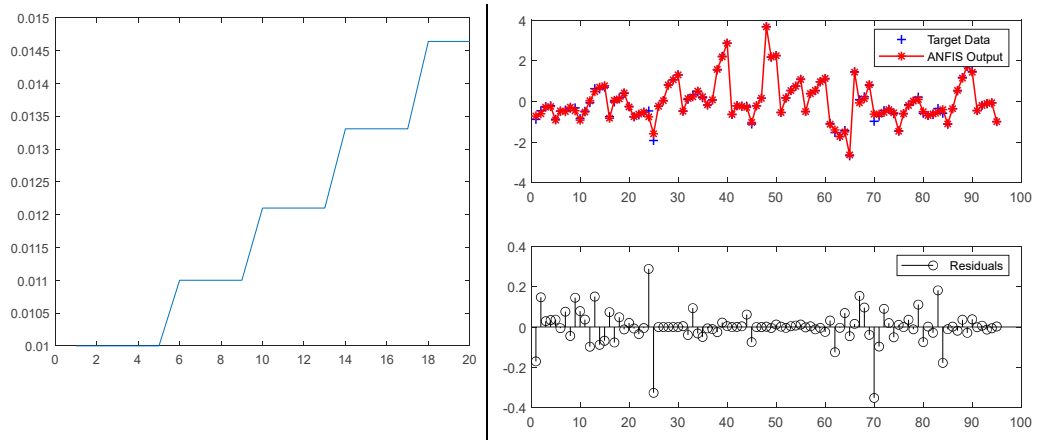

Figure 5. Model 5 features presentation.

ANFIS info:

- Number of nodes: 193
- Number of linear parameters: 405
- Number of nonlinear parameters: 36
- Total number of parameters: 441
- Number of training data pairs: 95
- Number of checking data pairs: 0
- Number of fuzzy rules: 81
- Minimal training RMSE = 0.0830715

3. Results and Discussion

Initially, the analysis of the Eurozone's resilience to crises and disturbances was made with the help of a dendrogram shown in Figure 6.

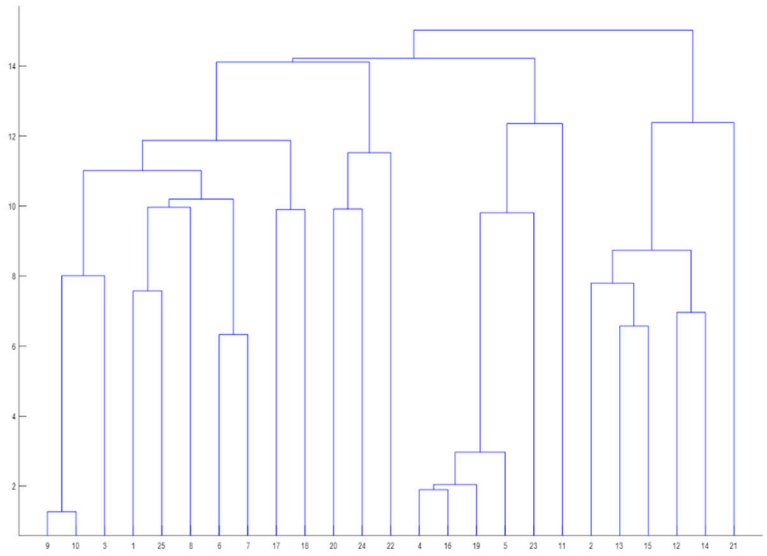

Figure 6. Display of clustering and association of selected variables.

Through cluster analysis using a dendrogram in Figure 6, it is possible to link the observed variables in the following way:

- Cluster 1 connects the parameters Exports of goods and services in % of GDP, Imports of goods and services in % of GDP, Energy imports dependency, Population by educational attainment level, and Share of fossil fuels in gross available energy. It is part of a large cluster together with cluster 2, and the indirect connection imposes the classification of the selected parameters in the same cluster. It points to the fact that in the observed period, the import and export of the Eurozone depends on energy issues, i.e., energy import and the share of fossil fuels in the total energy consumption, but also the level of education of the population, which contributes to the creation of various industrial policies, and the creation and use of innovative solutions in business and energy policy;
- Cluster 2 connects Real GDP per capita, Resource productivity and domestic material consumption, Digital inclusion—individuals, Enterprises that employ ICT specialists and Enterprises that provided training to develop/upgrade ICT skills of their personnel. This can also be characterised as the most important cluster, considering that in previous research, resilience to crises and disruptions was measured with the help of GDP per capita. Resilience to crises and disturbances in the Eurozone can therefore be directly linked to digitalisation and Resource productivity, and domestic material consumption;

- Cluster 3 connects Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices, High-speed internet coverage and Share of trade with the EU27. It is also part of a large cluster together with clusters 1 and 2. It indicates the possibility of potential inflationary consequences that can be mitigated by digitisation and the degree of trade with the EU27;
- Cluster 4 is not directly but indirectly connected to the most significant cluster 2 and connects the parameters HRST by category, sex and age, Energy efficiency, Employment in technology and knowledge-intensive sectors, GERD by sector of performance, Gross domestic expenditure on R&D by sector and Early leavers from education and training by sex. In fact, it can be seen from the cluster analysis on the dendrogram that this cluster depends on a large cluster consisting of the already mentioned cluster 1, 2 and 3. Therefore, it was concluded that investment in research and development and energy efficiency play a significant role in resilience to crises and disruptions;
- The last cluster 5 is separate, but indirectly linked to the other clusters, and it consists of Unemployment rates, Self-reported unmet needs for medical examination; Arrears (mortgage or rent, utility bills or hire purchase), People at risk of poverty or social exclusion, Inability to face unexpected financial expenses and Trade volume indices, by reporting country. In accordance with the previous research that were highlighted in the introductory section, and with regard to the variables classified in this way, it is possible to conclude that unemployment, financial instability, and the occurrence of large healthcare costs can be directly protected by the volume of trade.

The formed clusters were further observed through models created using ANFIS. Selected parameters for analysis and results of Model 1 are shown in Figure 7.

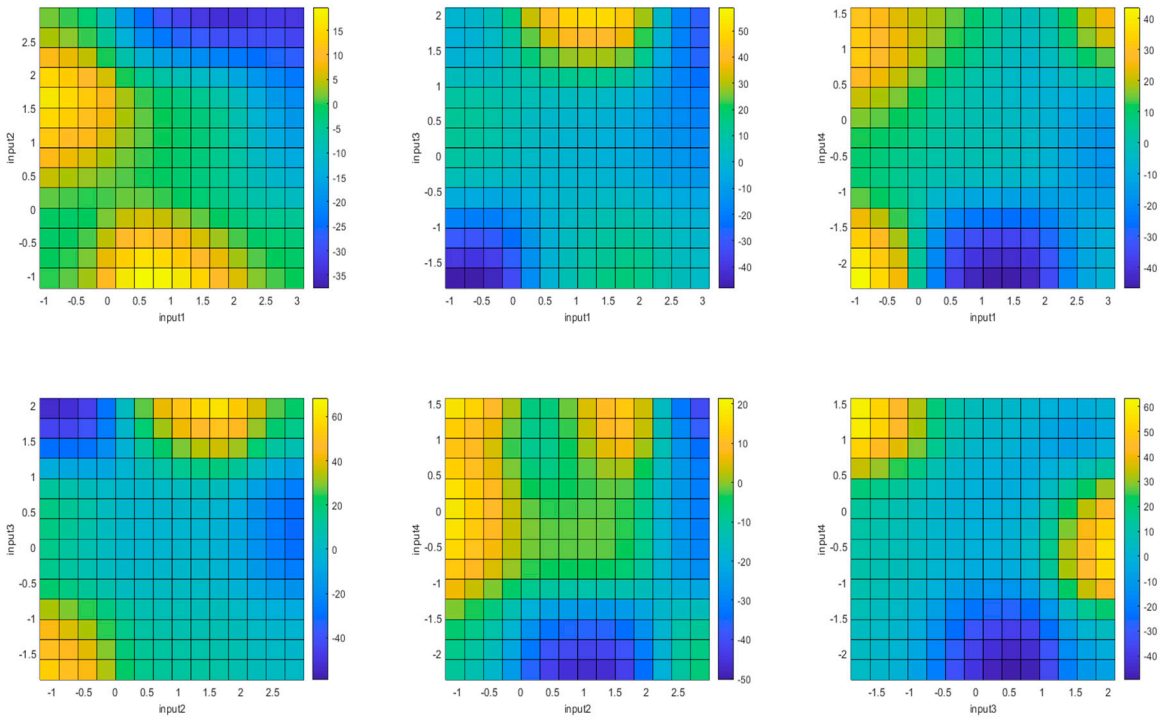

Figure 7. ANFIS results for Model 1. Input 1—Exports of goods and services in % of GDP, Input 2—Imports of goods and services in % of GDP, Input 3—Population by educational attainment level, Input 4—Share of fossil fuels in gross available energy, Output—Energy imports dependency.

Considering the analysis carried out in Model 1, high values of the Energy imports dependency parameter are associated with:

- medium values of Exports of goods and services in % of GDP with simultaneously very low values of Imports of goods and services in % of GDP;
- low values of Exports of goods and services in % of GDP with simultaneously high values of Imports of goods and services in % of GDP;
- medium values of Exports of goods and services in % of GDP with simultaneously high values of Population by educational attainment level;
- low values of Exports of goods and services in % of GDP with simultaneously low, but also high values of Share of fossil fuels in gross available energy;
- low values of Imports of goods and services in % of GDP with simultaneously low values of Population by educational attainment level;
- medium and high values of Imports of goods and services in % of GDP with simultaneously very high values of Population by educational attainment level;
- low values of Imports of goods and services in % of GDP with simultaneously medium to high values of Share of fossil fuels in gross available energy;
- low values of Population by educational attainment level with simultaneously very high values of Share of fossil fuels in gross available energy;
- very high values of Population by educational attainment level with simultaneously medium values of Share of fossil fuels in gross available energy.

On the other hand, low values of Energy imports dependency, which can be characterised as desirable, are associated with:

- medium to high values of Exports of goods and services in % of GDP with simultaneously very high values of Imports of goods and services in % of GDP;
- very low values of Exports of goods and services in % of GDP with simultaneously very low values of Population by educational attainment level;
- very high values of Exports of goods and services in % of GDP with simultaneously very high values of Population by educational attainment level;
- medium values of Exports of goods and services in % of GDP with simultaneously low values of Share of fossil fuels in gross available energy;
- low values of Imports of goods and services in % of GDP with simultaneously very high values of Population by educational attainment level (high share of population with high educational attainment level);
- very high values of Imports of goods and services in % of GDP with medium levels of Population by educational attainment level (high share of population with high educational attainment level);
- medium values of Imports of goods and services in % of GDP with simultaneously low values of Share of fossil fuels in gross available energy;
- high values of Imports of goods and services in % of GDP with medium and high values of Share of fossil fuels in gross available energy;
- medium values of Population by educational attainment level with simultaneously low values of Share of fossil fuels in gross available energy (high share of population with high educational attainment level).

Selected parameters for analysis and results of Model 2 are shown in Figure 8.

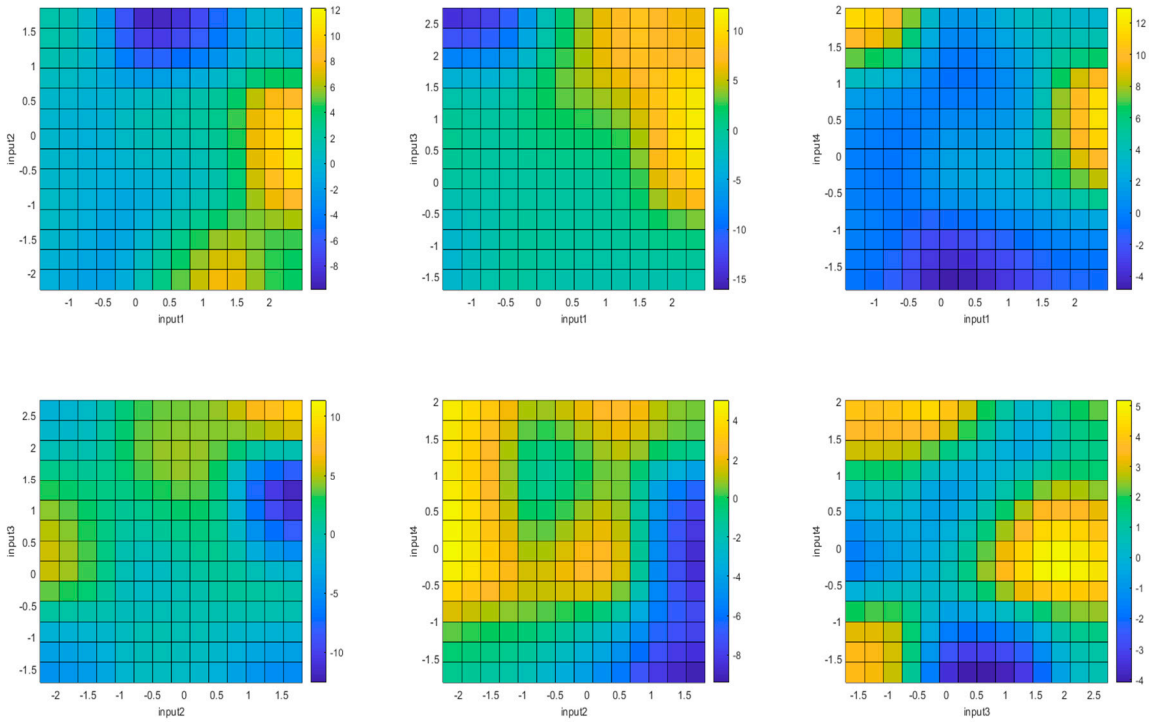

Figure 8. ANFIS results for Model 2. Input 1—Resource productivity and domestic material consumption, input 2—Digital inclusion—individuals, Input 3—Enterprises that employ ICT specialists, Input 4—Enterprises that provided training to develop/upgrade ICT skills of their personnel, Output—Real GDP per capita.

Considering the analysis carried out in Model 2, high values of the Real GDP per capita parameter are associated with:

- very high values of Resource productivity and domestic material consumption with simultaneously medium values of Digital inclusion—individuals;
- very high values of Resource productivity and domestic material consumption with simultaneously medium to high values of Enterprises that employ ICT specialists;
- low values of Resource productivity and domestic material consumption with simultaneously very high values of Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- very high values of Resource productivity and domestic material consumption with simultaneously medium values of Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- very high values of Digital inclusion—individuals with simultaneously very high values of Enterprises that employ ICT specialists;
- low values of Digital inclusion—individuals with simultaneously medium to high values of Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- low values of Enterprises that employ ICT specialists with simultaneously low, but also high values of Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- high values of Enterprises that employ ICT specialists with simultaneously medium values of Enterprises that provided training to develop/upgrade ICT skills of their personnel.

On the other hand, low values of the Real GDP per capita parameter are associated with:

- medium values of Resource productivity and domestic material consumption with simultaneously very high values of Digital inclusion—individuals;
- low values of Resource productivity and domestic material consumption with simultaneously very high values of Enterprises that employ ICT specialists;
- all values of Resource productivity and domestic material consumption with simultaneously medium values of Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- very high values of Digital inclusion—individuals with simultaneously high values of Enterprises that employ ICT specialists;
- very high values of Digital inclusion—individuals with simultaneously low to high values of (it does not apply only to very high values) Enterprises that provided training to develop/upgrade ICT skills of their personnel;
- medium values of Enterprises that employ ICT specialists with simultaneously very low values of Enterprises that provided training to develop/upgrade ICT skills of their personnel.

Selected parameters for analysis and the results of Model 3 are shown in Figure 9. The analysis using Model 3 indicates high values of Share of trade with the EU27 in the event of a combination of low values of Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices with simultaneously very high values of High-speed internet coverage, positive values of Share of trade with the EU27 are also associated with all other combinations of values of these two parameters, except in the case of the occurrence of very high values of Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices with the simultaneous occurrence of very low values of High-speed internet coverage, which indicate negative values of Share of trade with the EU27.

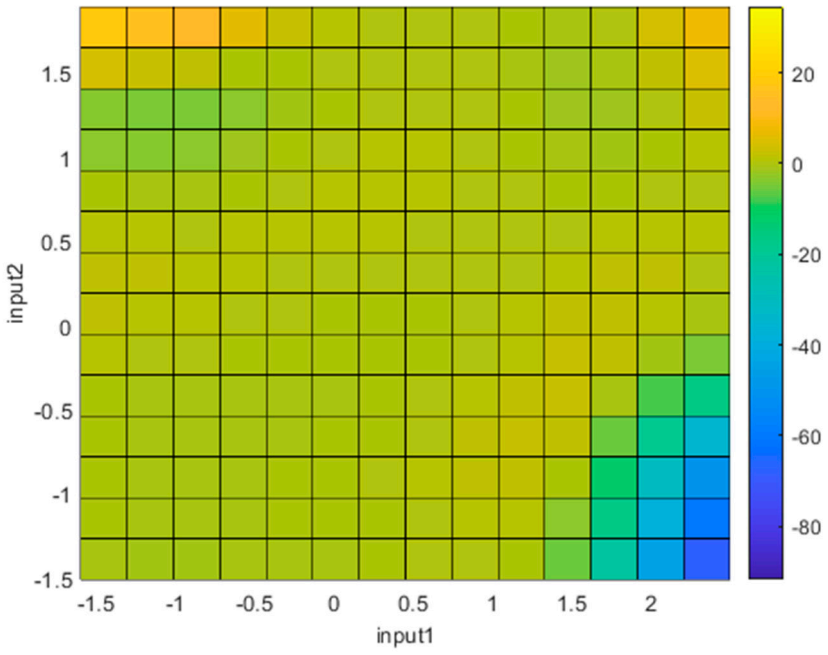

Figure 9. ANFIS results for Model 3. Input 1—Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices, Input 2—High-speed internet coverage, Output—Share of trade with the EU27.

Selected parameters for analysis and results of Model 4 are shown in Figure 10.

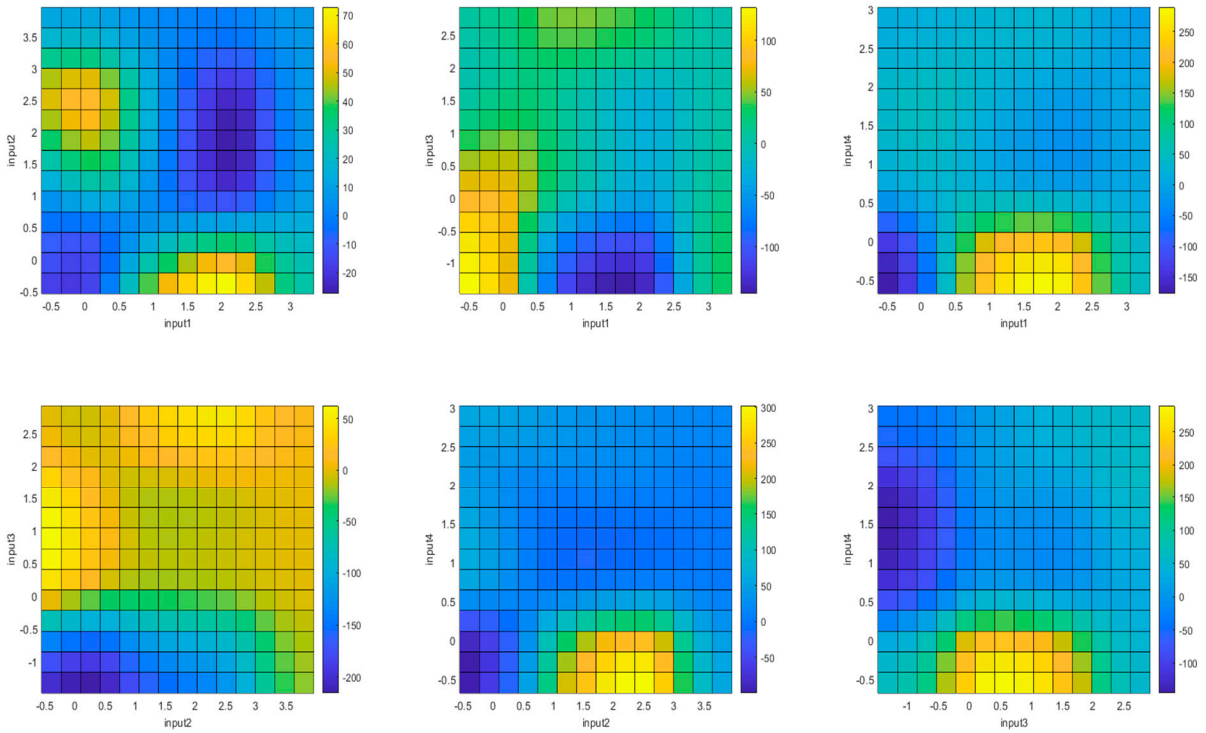

Figure 10. ANFIS results for Model 4. Input 1—HRST by category, sex and age, Input 2—GERD by sector of performance, Input 3—Early leavers from education and training by sex, Input 4—Energy efficiency, Output—Gross domestic expenditure on R&D by sector.

Considering the analysis carried out in Model 4, high values of the parameter Gross domestic expenditure on R&D by sector are associated with:

- medium to very high values of HRST by category with simultaneously low values of GERD by sector of performance;
- low values of HRST by category with simultaneously medium to high values of GERD by sector of performance;
- low values of HRST by category with simultaneously low values of Early leavers from education and training by sex;
- medium to high values of HRST by category with simultaneously low values of Energy efficiency;
- low values of GERD by sector of performance with simultaneously medium values of Early leavers from education;
- medium values of GERD by sector of performance with simultaneously low values of Energy efficiency;
- medium values of Early leavers from education and training with simultaneously low values of Energy efficiency.

On the other hand, the analysis showed that low values of the parameter Gross domestic expenditure on R&D by sector can be linked to:

- low values of HRST by category with simultaneously low values of GERD by sector of performance;
- high values of HRST by category with simultaneously medium values of GERD by sector of performance;
- medium values of HRST by category with simultaneously low values of Early leavers from education and training;
- low values of HRST by category with simultaneously low values of Energy efficiency;

- low values of GERD by sector of performance with simultaneously low values of Early leavers from education and training;
- low values of GERD by sector of performance with simultaneously low values of Energy efficiency;
- low values of Early leavers from education and training with simultaneously medium to high values of Energy efficiency.

Selected parameters for analysis and results of Model 5 are shown in Figure 11.

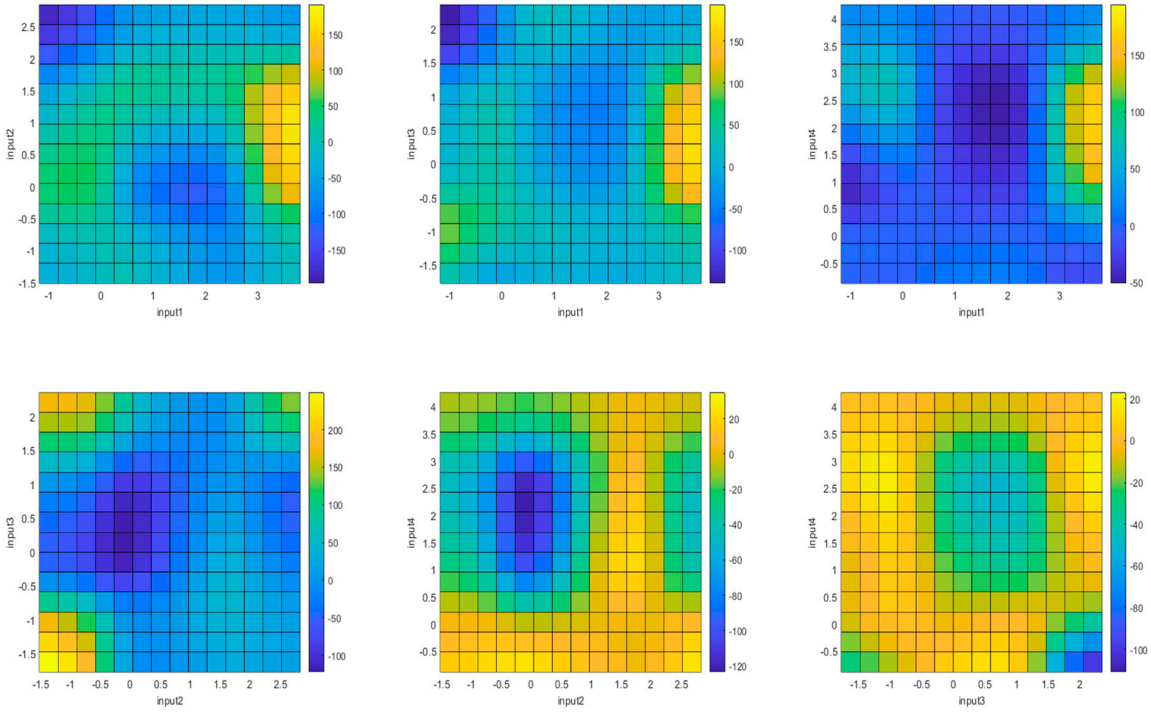

Figure 11. ANFIS results for Model 5. Input 1—Unemployment rates, Input 2—People at risk of poverty or social exclusion, Input 3—Inability to face unexpected financial expenses, Input 4—Arrears (mortgage or rent, utility bills or hire purchase), Output—Trade volume indices, by reporting country.

Considering the analysis carried out in Model 5, high values of the Trade volume indices parameter are associated with:

- high values of Unemployment rates with simultaneously medium values of People at risk of poverty or social exclusion;
- high values of Unemployment rates with simultaneously medium values of Inability to face unexpected financial expenses;
- high values of Unemployment rates with simultaneously medium values of Arrears;
- low values of People at risk of poverty or social exclusion with simultaneously low, but also very high values of Inability to face unexpected financial expenses;
- low values of People at risk of poverty or social exclusion with simultaneously low values of Arrears;
- low and very high values of Inability to face unexpected financial expenses with simultaneously high values of Arrears.

Low values of the Trade volume indices parameter are associated with:

- low values of Unemployment rates with simultaneously very high values of People at risk of poverty or social exclusion;
- low values of Unemployment rates with simultaneously very high values of Inability to face unexpected financial expenses;
- very low and medium values of Unemployment rates with simultaneously occurrence of medium values of Arrears;

- medium values of People at risk of poverty or social exclusion with simultaneously medium values of Inability to face unexpected financial expenses;
- low values of People at risk of poverty or social exclusion with simultaneously medium values of Arrears;
- very high values of Inability to face unexpected financial expenses with simultaneously very low values of Arrears.

4. Conclusions

The initially performed cluster analysis using the dendrogram indicates the connection of individual parameters, and should be used as such for the purpose of resilience, and in this context, it can be concluded that:

- import and exports of the Eurozone depend on energy issues, i.e., energy import and the share of fossil fuels in total energy consumption, but also the education attainment level of the population, which contributes to the creation of various industrial policies, and the creation and use of innovative solutions in business and energy policy;
- digitalisation is closely related to Resource productivity and domestic material consumption;
- inflationary consequences can be mitigated by digitisation (and preconditions for it, such as the availability of high-speed internet (5G and 6G)) and the share of trade with the EU27;
- investment in research and development and energy efficiency play a significant role in resilience to crises and disruptions;
- it can be directly protected from unemployment, financial instability, and the occurrence of large healthcare costs by using the volume of trade.

Therefore, an additional analysis was made with the models created using ANFIS, with regard to factors affecting Energy imports dependency, Real GDP per capita, Share of trade with the EU27, Gross domestic expenditure on R&D, and Trade volume indices.

The conclusions of the analysis carried out with regard to Energy imports dependency in the context of EU strategies are that lower dependence on energy imports is created by high values of exports, but also by imports at the same time and a lower rate of a highly educated population, and that low values of Share of fossil fuels in gross available energy are associated with medium values of Exports of goods and services in % of GDP. Likewise, medium values of Population by educational attainment level are associated with low values of Share of fossil fuels in gross available energy.

With regard to Real GDP per capita, it should be noted that higher values are achieved with very high values of Resource productivity and domestic material consumption, medium values of Digital inclusion, medium to high value of Enterprises that employ ICT specialists, very high value of Enterprises that employ ICT specialists, but also very high value of Enterprises that provided training to develop/upgrade ICT skills of their personnel.

The conclusions of the Model 3 analysis, with regard to Share of trade with the EU27, are that trade with the EU27 is related to High-speed internet coverage, and that high-speed internet coverage and significant trade with the EU27 are related to a low level of inflation.

Regarding a very important factor related to resilience, according to previous research, Gross domestic expenditure on R&D according to the conducted analysis is linked to medium to high values of human potential for science and technology (HRST), or high values of Total intramural expenditure on R&D (GERD) by sector of performance. Namely, high values (investments) are expected in one of the mentioned indicators with simultaneously low values of the other indicator. According to the analysis, high investments in Gross domestic expenditure on R&D also mean low energy efficiency (probably due to the impossibility of simultaneous large investments in both directions).

Finally, high values of the parameter Trade volume indices are linked to medium values of People at risk of poverty or social exclusion, medium values of Inability to face unexpected financial expenses, and medium values of Arrears in case of high unemploy-

ment, but the analysis showed that they also bring low values of People at risk of poverty or social exclusion with simultaneously low values of Arrears and low values of Inability to face unexpected financial expenses. Therefore, this indicator can be characterised as very significant in terms of resilience to crises and disruptions in the Eurozone.

It is not entirely appropriate to compare the results of this research with already conducted research on this topic, but it is possible to point out a link: redundancy when managing predictable volatilities and flexibility when adapting to extreme circumstance [29]; innovation, openness, propensity to export, industrial relations, and network system [29]; original state before economic shocks or to adapt and grow faster after a particular shock [29]; reducing vulnerability (for example stockpiling and structural reforms [13]; sensitivity of regional production and employment [30]; possibility to indirectly predict the recovery of regional and national economies [29]; overall level of economic activity suffer [30]; Innovation plays a major role in creating resilience [30]; importance of trade openness as determinant of regional resilience [30]; quality of urban infrastructure [31].

The advantages of this study that we found in the proposed methodology that is more appropriate for this kind of analysis then some other methodologies, such as panel study and/or GMM, because the significant number of variables are used without the fear of inter correlations. Possible limitations could be seen in the light of used inputs (data) because we couldn't include the latest 2021 and 2022 inputs, as many macroeconomic data have been published with delay.

Similar research based on the proposed model can be carried out for some other regions such as MENA, LAC, LATAM, APAC, etc. and those regions could be compared to, i.e., Eurozone in future research to distinguish global from regional macroeconomic trends.

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Appendix A

Table A1. Data for Analysis.

	1	2	3	4	5
	Real GDP per capita	Unemployment rates	Population by educational attainment level	HRST by category, sex and age	GERD by sector of performance
Austria 2016	36,390	6.0	28.5	416.1	11,145.02
2017	36,980	5.5	28.4	390.9	11,289.78
2018	37,720	4.9	29.7	404.0	11,911.85
2019	38,110	4.5	30.5	410.7	12,441.23
2020	35,390	5.4	30.9	392.1	12,143.11
Belgium 2016	34,620	7.8	29.5	443.6	10,852.674
2017	35,050	7.1	32.0	469.5	11,867.98
2018	35,520	6.0	32.8	488.4	13,158.25
2019	36,090	5.4	32.2	496.4	15,109.89
2020	33,880	5.6	33.7	509.8	15,887.07

Table A1. *Cont.*

	1	2	3	4	5
	Real GDP per capita	Unemployment rates	Population by educational attainment level	HRST by category, sex and age	GERD by sector of performance
Estonia 2016	13,620	6.8	42.5	61.3	270.34
2017	14,410	5.8	40.1	61.5	304.32
2018	14,970	5.4	44.2	64.9	365.64
2019	15,510	4.4	46.5	69.4	452.97
2020	15,010	6.8	48.3	68.4	481
Finland 2016	35,330	8.8	28.0	252.9	5926.10
2017	36,380	8.6	25.5	263.1	6173.20
2018	36,740	7.4	24.8	287.0	6437.70
2019	37,150	6.7	29.1	289.8	6715.10
2020	36,050	7.8	31.7	296.4	6932.60
France 2016	31,770	10.1	28.9	2613.2	49,650.92
2017	32,360	9.4	29.1	2778.4	50,513.50
2018	32,820	9.0	30.3	2906.4	51,913.80
2019	33,320	8.4	31.2	3028.5	53,427.81
2020	30,610	8.0	33.5	3168.5	54,230.72
Greece 2016	16,890	23.6	15.6	219.7	1754.18
2017	17,110	21.5	16.7	231.6	2038.43
2018	17,430	19.3	15.4	233.2	2179.31
2019	17,760	17.3	14.8	241.5	2337.66
2020	16,170	16.3	14.5	267.2	2473.45
The Netherlands 2016	39,810	6.0	26.8	745.7	15,235.00
2017	40,730	4.9	27.7	782.9	16,081.00
2018	41,450	3.8	27.4	802.3	16,554.00
2019	41,980	3.4	34.7	873.3	17,760.00
2020	40,160	3.8	37.4	901.0	18,356.00
Ireland 2016	50,060	8.4	51.0	180.0	3175.10
2017	53,930	6.7	51.1	184.9	3727.60
2018	58,100	5.8	51.0	186.1	3812.43
2019	60,130	5.0	50.3	192.1	4370.61
2020	62,980	5.7	52.7	204.6	4594.97
Italy 2016	26,240	11.7	11.7	989.7	23,171.61
2017	26,730	11.2	12.3	1096	23,793.65
2018	27,030	10.6	12.7	1190	25,232.24
2019	27,210	10.0	12.6	1250.1	26,259.66
2020	24,900	9.2	12.2	1282.4	25,364.33
Cyprus 2016	22,310	13.0	33.2	30.7	98.82
2017	23,400	11.1	35.1	32.3	110.21
2018	24,430	8.4	38.6	32.0	133.09
2019	25,370	7.1	38.6	31.9	164.44
2020	23,770	7.6	36.7	33.8	177.20
Latvia 2016	11,110	9.6	32.5	68.1	110.404
2017	11,590	8.7	32.7	68.7	137.90
2018	12,140	7.4	28.7	70.0	186.20
2019	12,530	6.3	31.1	74.1	195.20
2020	12,150	8.1	34.9	77.8	204.90
Lithuania 2016	12,070	7.9	34.8	103.3	327.61
2017	12,760	7.1	35.9	105.0	378.91
2018	13,400	6.2	33.9	104.6	426.31
2019	14,050	6.3	35.8	109.1	485.99
2020	14,030	8.5	37.5	111.9	571.95
Luxemburg	84,750	6.3	47.1	17.6	712.10
2017	84,020	5.5	44.1	15.4	720.70
2018	84,040	5.6	48.3	21.1	704.50
2019	85,030	5.6	51.8	23.8	737.80
2020	82,250	6.8	50.6	23.1	724.80

Table A1. *Cont.*

	1	2	3	4	5
	Real GDP per capita	Unemployment rates	Population by educational attainment level	HRST by category, sex and age	GERD by sector of performance
Malta 2016	20,080	4.7	27.5	15.5	58.70
2017	21,790	4.0	35.0	16.1	65.93
2018	22,320	3.7	39.6	16.1	74.63
2019	22,730	3.6	42.5	16.1	80.05
2020	20,410	4.4	41.3	16.8	85.59
Germany 2016	34,610	4.1	22.3	3.40	92,173.56
2017	35,410	3.8	22.9	3.52	99,553.62
2018	35,690	3.4	23.2	3.66	104,669.05
2019	35,980	3.1	23.6	3.77	110,025.41
2020	34,310	3.8	25.2	3.96	105,596.20
Portugal 2016	17,010	11.2	28.4	222.3	2388.47
2017	17,650	9.0	30.4	244.8	2585.10
2018	18,190	7.1	30.8	253.2	2769.07
2019	18,670	6.5	31.1	271.0	2991.864
2020	17,070	6.9	33.6	301.9	3202.86
Slovakia 2016	14,550	9.7	24.3	135.3	640.84
2017	14,960	8.1	27.5	143.6	748.96
2018	15,510	6.5	30.8	147.0	750.95
2019	15,890	5.8	36.6	147.5	776.59
2020	15,180	6.7	36.8	142.8	838.93
Slovenia 2016	18,550	8.0	13.7	56.1	811.95
2017	19,440	6.6	18.1	56.4	802.29
2018	20,240	5.1	16.4	59.9	892.72
2019	20,720	4.5	14.6	58.6	990.69
2020	19,720	5.0	17.3	62.8	1007.49
Spain 2016	23,760	19.6	23.9	1,250.9	13,260.00
2017	24,430	17.2	24.4	1,299.5	14,063.00
2018	24,880	15.3	25.1	1,358.2	14,946.00
2019	25,200	14.1	26.9	1,447.2	15,572.00
2020	22,350	15.5	28.2	1,567.6	15,768.00
	6	7	8	9	10
	Enterprises that employ ICT specialists	Enterprises that provided training to develop/upgrade ICT skills of their personnel	Digital inclusion—individuals	Exports of goods and services in % of GDP	Imports of goods and services in % of GDP
Austria 2016	25	13	82	52.4	48.6
2017	23	15	85	54.1	50.9
2018	20	10	85	55.4	52.4
2019	20	10	86	55.4	52.0
2020	20	11	86	51.4	48.6
Belgium 2016	26	15	84	79.4	78.2
2017	29	17	86	83.2	82.1
2018	28	17	87	83.0	83.3
2019	28	18	89	82.2	81.5
2020	30	18	90	80.0	78.6
Estonia 2016	15	7	85	77.0	73.4
2017	15	7	86	75.8	71.8
2018	13	7	87	74.5	71.9
2019	15	9	88	74.0	69.9
2020	17	10	88	71.2	70.7
Finland 2016	24	15	91	34.8	36.1
2017	26	15	92	37.5	37.5
2018	26	15	93	38.5	39.7
2019	26	15	93	39.9	39.7
2020	28	15	95	36.2	35.9
France 2016	16	9	82	30.2	30.9
2017	17	9	83	30.9	32.0
2018	17	9	85	31.7	32.7
2019	17	9	87	31.6	32.5
2020	18	8	87	27.9	29.9

Table A1. *Cont.*

	6	7	8	9	10
	Enterprises that employ ICT specialists	Enterprises that provided training to develop/upgrade ICT skills of their personnel	Digital inclusion—individuals	Exports of goods and services in % of GDP	Imports of goods and services in % of GDP
Greece 2016	30	10	66	31.3	32.7
2017	20	8	67	35.0	36.5
2018	22	9	70	39.0	41.2
2019	22	9	74	40.1	41.9
2020	19	8	77	32.0	39.6
The Netherlands 2016	26	14	92	79.5	69.3
2017	27	16	94	83.4	72.6
2018	27	17	94	84.7	74.1
2019	25	16	95	82.5	72.7
2020	24	15	93	77.9	67.4
Ireland 2016	35	13	79	121.5	105.9
2017	33	14	79	121.1	99.0
2018	32	14	80	123.0	94.4
2019	32	14	88	127.9	124.4
2020	30	12	89	131.1	108.8
Italy 2016	17	5	67	29.3	26.0
2017	16	6	69	30.7	27.9
2018	16	7	72	31.4	28.9
2019	16	8	74	31.6	28.3
2020	13	8	76	29.4	25.7
Cyprus 2016	25	13	74	70.5	68.8
2017	25	12	79	73.9	74.4
2018	23	12	84	75.1	73.8
2019	23	12	85	75.6	75.4
2020	25	12	91	76.0	78.6
Latvia 2016	17	5	77	59.6	59.3
2017	14	5	78	61.6	62.2
2018	15	5	81	61.5	62.2
2019	20	8	84	59.8	60.5
2020	20	7	87	60.3	59.2
Lithuania 2016	15	6	72	67.6	66.9
2017	18	6	75	73.6	71.3
2018	17	5	78	75.2	73.4
2019	15	6	81	77.3	72.1
2020	16	7	82	73.5	64.2
Luxemburg	24	15	97	191.1	157.3
2017	24	16	96	192.7	161.0
2018	24	15	92	196.4	163.7
2019	25	16	93	205.5	174.6
2020	22	13	96	204.7	171.6
Malta 2016	26	12	77	151.3	140.9
2017	24	13	80	150.4	132.7
2018	24	13	80	141.3	124.7
2019	27	14	85	140.6	124.6
2020	29	16	86	142.8	130.9
Germany 2016	22	12	87	46.1	38.7
2017	19	12	87	47.2	40.1
2018	20	13	90	47.3	41.1
2019	19	13	91	46.6	41.0
2020	19	12	93	43.4	37.7
Portugal 2016	19	10	68	40.2	39.1
2017	20	11	71	42.7	41.7
2018	19	9	71	43.4	43.0
2019	21	11	73	43.5	43.1
2020	20	10	76	37.0	39.1

Table A1. *Cont.*

	6	7	8	9	10
	Enterprises that employ ICT specialists	Enterprises that provided training to develop/upgrade ICT skills of their personnel	Digital inclusion—individuals	Exports of goods and services in % of GDP	Imports of goods and services in % of GDP
Slovakia 2016	20	11	78	93.8	90.8
2017	20	9	79	95.3	93.1
2018	18	9	78	96.3	94.4
2019	18	9	82	92.3	91.9
2020	17	9	88	85.4	84.5
Slovenia 2016	20	13	73	77.6	69.1
2017	19	13	77	83.1	74.1
2018	20	13	79	84.8	76.4
2019	18	11	81	84.0	75.3
2020	17	11	85	77.9	68.7
Spain 2016	25	13	76	33.9	29.9
2017	21	11	80	35.1	31.5
2018	18	10	83	35.2	32.4
2019	17	9	88	35.0	32.0
2020	17	9	91	30.6	29.1
	12	13	14	15	16
	People at risk of poverty or social exclusion	Self-reported unmet needs for medical examination	Inability to face unexpected financial expenses	Arrears (mortgage or rent, utility bills or hire purchase)	Energy efficiency
Austria 2016	18.0	0.1	22.6	6.5	32.04
2017	18.1	0.2	20.6	5.9	32.82
2018	17.5	0.1	20.1	4.9	31.82
2019	16.9	0.2	18.5	4.3	32.27
2020	17.5	0.1	17.6	5.3	29.73
Belgium 2016	20.9	2.5	26.0	7.0	48.45
2017	20.6	2.4	25.5	5.4	48.49
2018	20.0	2.0	24.5	6.1	46.47
2019	19.5	1.9	25.3	5.5	48.41
2020	18.9	1.6	23.3	5.6	43.88
Estonia 2016	24.4	0.3	31.6	8.9	5.90
2017	23.4	0.7	36.3	7.3	5.65
2018	24.4	0.7	34.7	8.0	6.06
2019	24.3	0.5	31.4	8.5	4.71
2020	23.3	0.6	30.5	6.0	4.31
Finland 2016	16.6	0	29.4	10.9	32.22
2017	15.7	0.0	28.5	10.8	32.09
2018	16.5	0.0	27.2	10.7	32.73
2019	15.6	0.1	26.4	10.5	32.01
2020	16.0	0.0	25.4	10.0	29.80
France 2016	18.2	0.6	31.8	8.8	239.95
2017	17.0	0.9	29.6	9.1	239.19
2018	17.4	0.9	31.4	9.1	238.60
2019	17.9	0.9	30.6	8.4	235.16
2020	18.2	0.9	30.4	8.9	208.36
Greece 2016	35.6	9.2	53.6	47.9	23.06
2017	34.8	6.2	52.7	44.9	23.24
2018	31.8	7.1	50.4	43.0	22.61
2019	30.0	5.9	47.8	41.4	22.26
2020	28.9	3.8	50.4	36.5	19.68
The Netherlands 2016	16.7	0	22.5	5.0	64.92
2017	17.0	0.0	20.7	4.6	64.87
2018	16.7	0.1	21.5	3.8	64.23
2019	16.5	0.1	21.9	4.0	63.46
2020	16.1	0.2	19.1	3.2	58.38

Table A1. *Cont.*

	12	13	14	15	16
	People at risk of poverty or social exclusion	Self-reported unmet needs for medical examination	Inability to face unexpected financial expenses	Arrears (mortgage or rent, utility bills or hire purchase)	Energy efficiency
Ireland 2016	24.4	1.7	45.2	15.4	14.70
2017	22.7	1.5	41.6	13.0	14.36
2018	21.1	1.0	37.3	11.2	14.62
2019	20.6	1.0	38.0	11.9	14.69
2020	20.9	0.8	35.6	15.1	13.43
Italy 2016	30.0	3.2	40.4	10.7	147.97
2017	28.9	1.3	38.3	6.1	148.95
2018	27.3	1.6	35.1	6.0	147.24
2019	25.6	1.1	33.8	5.9	145.89
2020	26	1	34	6	132.32
Cyprus 2016	27.7	0.6	56.6	26.6	2.42
2017	25.2	1.6	50.1	24.8	2.53
2018	23.9	1.5	49.5	21.6	2.55
2019	22.3	1.2	47.5	17.6	2.54
2020	21.3	0.4	44.6	14.7	2.20
Latvia 2016	28.5	0.8	60.0	14.9	4.29
2017	28.2	4.1	59.9	14.0	4.47
2018	28.4	3.8	55.3	13.8	4.69
2019	27.3	2.6	49.8	9.9	4.56
2020	26.0	2.9	45.6	9.7	4.26
Lithuania 2016	30.1	0.0	53.2	10.7	6.04
2017	29.6	0.3	50.6	8.7	6.16
2018	28.3	0.4	48.8	10.3	6.37
2019	26.3	0.2	46.8	8.2	6.28
2020	24.8	0.1	41.8	7.1	6.23
Luxemburg	19.1	0.4	21.9	6.6	4.15
2017	19.4	0.3	20.4	3.0	4.29
2018	20.7	0.3	19.7	4	4.46
2019	20.6	0.2	16.7	4	4.50
2020	20.9	0.1	22.5	4.9	3.94
Malta 2016	20.3	0.7	20.8	10.4	0.71
2017	19.3	0.0	15.6	6.5	0.81
2018	19.0	0.0	13.9	8.1	0.82
2019	20.1	0.0	15.1	7.8	0.87
2020	19.0	0.0	16.3	7.0	0.74
Germany 2016	19.7	0.2	30.0	4.2	297.63
2017	19.0	0.1	29.3	4.4	298.12
2018	18.7	0.1	28.1	4.6	291.95
2019	17.4	0.1	26.0	3.7	285.24
2020	24.0	0.1	37.9	5.1	262.49
Portugal 2016	25.1	1.0	38.3	9.3	21.76
2017	23.3	1.8	36.9	7.7	22.81
2018	21.6	1.4	34.7	6.6	22.64
2019	21.6	1.2	33.0	5.8	22.05
2020	19.8	1.1	30.8	5.4	19.54
Slovakia 2016	18.1	0.4	37.9	7.5	15.37
2017	16.3	0.7	34.6	7.4	16.15
2018	16.3	0.5	31.5	9.9	15.79
2019	16.4	0.5	30.0	10.2	15.98
2020	14.8	0.7	26.1	6.7	15.15
Slovenia 2016	18.4	0	41.7	17.4	6.55
2017	17.1	0.2	37.1	15.2	6.73
2018	16.2	0.1	33.1	13.6	6.65
2019	14.4	0.0	33.0	12.2	6.52
2020	15.0	0.1	29.6	10.3	6.13
Spain 2016	27.9	0.2	38.7	10.6	118.46
2017	26.6	0.1	36.6	9.3	124.94
2018	26.1	0.1	35.9	9.4	124.33
2019	25.3	0.0	33.9	8.1	120.66
2020	26.4	0.0	35.4	13.5	105.03

Table A1. *Cont.*

	17	18	19	20	21
	Energy imports dependency	Share of fossil fuels in gross available energy	Employment in technology and knowledge-intensive sectors	Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices	Trade volume indices, by reporting country
Austria 2016	62.09	67.96	182.5	100.97	98.6
2017	63.93	68.55	186.0	103.22	103.7
2018	64.23	68.31	179.1	105.41	106.1
2019	71.62	69.23	171.8	106.98	106.6
2020	58.32	66.83	175.0	108.47	98.7
Belgium 2016	75.89	75.53	196.7	101.77	103.4
2017	75.26	76.04	211.3	104.03	104.1
2018	82.97	79.65	230.5	106.44	105.2
2019	77.59	76.47	245.1	107.77	105.4
2020	78.06	76.49	243.7	108.23	99.1
Estonia 2016	8.11	86.83	34.8	100.80	103.4
2017	4.69	86.19	36.4	104.48	108.4
2018	1.01	84.69	36.4	108.05	116.7
2019	4.83	72.75	38.3	110.50	116.5
2020	11.05	66.14	38.0	109.80	117.6
Finland 2016	46.19	47.21	138.1	100.39	100.2
2017	43.98	44.80	140.3	101.23	108.9
2018	44.86	44.97	146.3	102.42	111.2
2019	42.14	42.72	155.6	103.58	114.0
2020	42.02	41.42	167.8	103.98	106.2
France 2016	47.40	50.30	1.0655	100.31	100.1
2017	48.80	50.91	1.0779	101.47	101.3
2018	46.85	49.22	1.1048	103.60	102.8
2019	47.56	49.63	1.1820	104.95	103.6
2020	44.47	47.94	1.2273	105.50	86.2
Greece 2016	72.91	86.36	90.4	100.02	106.3
2017	71.28	86.99	93.8	101.15	109.6
2018	70.68	85.86	105.6	101.94	118.9
2019	74.19	84.54	116.0	102.46	121.9
2020	81.78	81.75	119.5	101.17	124.8
The Netherlands 2016	45.93	94.01	335.0	100.11	103.5
2017	51.85	93.93	326.8	101.40	110.4
2018	59.43	92.85	339.3	103.02	113.0
2019	64.29	92.35	368.9	105.78	114.9
2020	67.89	90.40	388.1	106.96	111.3
Ireland 2016	69.08	92.90	179.8	99.8	107.1
2017	66.88	91.33	183.3	100.1	110.0
2018	67.56	90.24	181.3	100.8	127.7
2019	68.70	88.84	187.5	101.7	135.7
2020	71.30	87.36	210.1	101.2	143.4
Italy 2016	77.65	81.34	779.5	99.9	101.5
2017	76.98	80.18	774.5	101.3	106.6
2018	76.34	79.30	812.7	102.5	106.4
2019	77.48	79.26	854.4	103.2	106.4
2020	73.45	77.70	879.9	103.0	95.9
Cyprus 2016	95.84	94.10	10.7	98.78	106.6
2017	95.93	93.68	11.7	99.45	111.0
2018	92.49	91.79	12.8	100.23	153.1
2019	92.79	91.52	11.8	100.78	135.2
2020	93.08	89.04	13.4	99.67	136.2
Latvia 2016	47.15	63.61	27.9	100.10	102.7
2017	44.05	59.89	31.8	103.00	111.2
2018	44.31	59.83	31.9	105.63	115.6
2019	43.91	61.20	29.8	108.53	118.2
2020	45.48	57.34	35.3	108.62	122.2

Table A1. *Cont.*

	17	18	19	20	21
	Energy imports dependency	Share of fossil fuels in gross available energy	Employment in technology and knowledge-intensive sectors	Harmonised Indices of Consumer Prices (HICPs) all items—annual average indices	Trade volume indices, by reporting country
Lithuania 2016	74.78	67.44	33.3	100.68	103.2
2017	71.96	66.40	33.4	104.42	113.8
2018	73.89	66.07	40.1	107.07	115.5
2019	75.20	66.31	44.1	109.47	120.7
2020	74.91	67.16	44.7	110.63	122.4
Luxemburg	96.29	81.79	9.3	100.04	96.2
2017	95.58	81.62	10.4	102.15	90.9
2018	95.18	81.70	11.9	104.21	88.5
2019	95.04	81.81	12.5	105.93	92.1
2020	92.46	78.62	12.4	105.93	77.2
Malta 2016	101.08	93.69	12.7	100.90	126.6
2017	103.05	96.18	12.6	102.18	110.2
2018	97.53	96.77	12.9	103.95	111.9
2019	97.28	96.73	14.6	105.54	118.6
2020	97.56	96.85	15.5	106.37	97.5
Germany 2016	63.75	82.26	1.6704	100.4	100.5
2017	63.96	82.22	1.7037	102.1	103.8
2018	63.48	81.40	1.7382	104.0	104.6
2019	67.06	80.02	1.7620	105.5	101.9
2020	63.67	78.38	2.2185	105.8	91.8
Portugal 2016	72.24	76.15	125.2	100.64	102.0
2017	77.96	79.44	134.1	102.20	107.2
2018	75.65	76.32	143.2	103.40	109.2
2019	73.86	74.44	154.8	103.71	111.7
2020	65.26	70.58	173.0	103.58	102.2
Slovakia 2016	60.55	65.12	103.3	99.52	100.9
2017	64.85	66.15	111.8	100.90	101.5
2018	63.68	66.80	110.6	103.46	105.0
2019	69.76	62.41	117.2	106.33	102.2
2020	56.22	62.08	133.9	108.47	95.8
Slovenia 2016	49.02	64.65	50.3	99.85	104.9
2017	50.77	63.95	54.5	101.40	115.4
2018	51.21	65.00	53.7	103.36	123.3
2019	52.12	63.98	56.1	105.11	129.7
2020	45.80	61.16	68.0	104.82	126.8
Spain 2016	71.47	74.56	656.6	99.66	103.8
2017	73.87	76.28	706.2	101.69	106.9
2018	73.59	75.51	699.0	103.46	107.8
2019	75.02	74.48	732.2	104.26	108.3
2020	67.89	70.76	746.5	103.91	97.3
	22	23	24	25	
	Share of trade with the EU27	Gross domestic expenditure on R&D by sector	High-speed internet coverage	Resource productivity and domestic material consumption	
Austria 2016	76.2	3.12	8.0	2.09	
2017	75.7	3.06	12.4	2.16	
2018	75.8	3.09	13.0	2.19	
2019	76.2	3.13	13.8	2.22	
2020	76.9	3.22	39.3	2.09	
Belgium 2016	59.0	2.52	0.6	2.79	
2017	59.7	2.67	0.8	2.76	
2018	60.0	2.86	1.4	2.87	
2019	59.9	3.17	66.5	3.49	
2020	61.2	3.52	67.5	3.05	

Table A1. *Cont.*

	22	23	24	25
	Share of trade with the EU27	Gross domestic expenditure on R&D by sector	High-speed internet coverage	Resource productivity and domestic material consumption
Estonia 2016	79.3	1.24	48.5	0.60
2017	78.5	1.28	50.7	0.55
2018	74.0	1.42	54.2	0.54
2019	75.8	1.63	57.4	0.63
2020	75.2	1.79	70.9	0.65
Finland 2016	69.9	2.72	31.6	1.25
2017	68.9	2.73	31.7	1.23
2018	67.6	2.76	31.4	1.19
2019	68.9	2.8	61.8	1.31
2020	71.6	2.94	66.7	1.29
France 2016	65.4	2.22	20.8	3.06
2017	65.1	2.2	28.3	2.90
2018	64.5	2.2	37.8	3.02
2019	63.7	2.19	43.8	3.05
2020	66.1	2.35	52.6	3.12
Greece 2016	54.2	1.01	0.4	1.40
2017	52.8	1.15	0.4	1.47
2018	50.1	1.21	0.4	1.51
2019	51.3	1.27	7.1	1.68
2020	57.1	1.49	10.2	1.77
The Netherlands 2016	41.6	2.15	31.2	4.17
2017	40.9	2.18	31.9	4.63
2018	40.2	2.14	32.2	4.60
2019	40.3	2.18	88.6	4.97
2020	41.7	2.29	89.8	4.90
Ireland 2016	37.4	1.18	5.5	2.59
2017	38.4	1.26	8.3	2.65
2018	38.0	1.17	12.9	2.68
2019	38.1	1.23	35.4	2.75
2020	37.9	1.23	83.3	3.12
Italy 2016	57.7	1.37	18.8	3.46
2017	57.3	1.37	21.7	3.53
2018	56.2	1.42	23.9	3.52
2019	57.0	1.47	30.0	3.56
2020	58.3	1.54	33.7	3.54
Cyprus 2016	60.7	0.52	1	1.43
2017	54.6	0.55	1	1.26
2018	51.0	0.62	0.5	1.34
2019	59.2	0.74	10.1	1.30
2020	57.8	0.85	26.2	1.30
Latvia 2016	78.0	0.44	85.2	1.09
2017	75.8	0.51	85.7	1.00
2018	72.1	0.64	87.8	0.96
2019	74.9	0.64	88.1	1.03
2020	76.1	0.7	88.1	1.04
Lithuania 2016	68.3	0.84	50.1	0.85
2017	67.4	0.9	54.4	0.79
2018	66.1	0.94	60.6	0.83
2019	66.4	1	61.0	0.81
2020	70.7	1.17	67.1	0.82
Luxemburg	76.3	1.3	51.5	3.95
2017	81.8	1.27	57.2	3.80
2018	86.6	1.17	63.4	4.12
2019	83.5	1.16	92.0	4.10
2020	89.0	1.13	95.1	4.47

Table A1. *Cont.*

	22	23	24	25
	Share of trade with the EU27	Gross domestic expenditure on R&D by sector	High-speed internet coverage	Resource productivity and domestic material consumption
Malta 2016	49.5	0.56	16.0	1.66
2017	54.6	0.55	23.0	2.09
2018	63.1	0.57	31.6	1.88
2019	53.9	0.57	100.0	2.13
2020	57.3	0.66	100.0	1.90
Germany 2016	62.2	2.94	7.1	2.53
2017	62.2	3.05	7.3	2.52
2018	62.7	3.11	8.5	2.68
2019	63.1	3.17	32.7	2.80
2020	63.1	3.14	55.9	2.75
Portugal 2016	74.9	1.28	49.6	1.19
2017	73.7	1.32	63.6	1.12
2018	73.4	1.35	70.2	1.16
2019	73.8	1.4	83.0	1.16
2020	74.7	1.58	86.6	1.09
Slovakia 2016	78.8	0.79	39.5	1.21
2017	78.6	0.89	41.3	1.20
2018	78.5	0.84	42.9	1.18
2019	78.9	0.83	45.5	1.33
2020	80.3	0.92	50.2	1.33
Slovenia 2016	69.6	2.01	50.4	1.51
2017	68.2	1.87	52.2	1.55
2018	66.0	1.95	61.1	1.46
2019	62.2	2.05	63.8	1.60
2020	58.7	2.15	65.6	1.53
Spain 2016	57.5	1.19	62.8	2.77
2017	55.7	1.21	71.4	2.79
2018	54.7	1.24	77.4	2.66
2019	54.6	1.25	89.0	2.80
2020	56.7	1.41	91.7	2.76

References

1. Madni, A.M.; Jackson, S. Towards a Conceptual Framework for Resilience Engineering. *IEEE Syst. J.* **2009**, *3*, 181–191. Available online: https://www.researchgate.net/publication/224436791_Towards_a_Conceptual_Framework_for_Resilience_Engineering (accessed on 3 February 2022). [CrossRef]
2. Gibson, C.A.; Tarrant, M. A 'conceptual models' approach to organizational resilience. *Aust. J. Emerg. Manag.* **2010**, *25*, 6–12. Available online: https://www.researchgate.net/publication/285685600_A_\T1\textquoterightconceptual_models\T1\textquoteright_approach_to_organisational_resilience_Gibson_and_tarrant_discuss_the_range_of_inter-dependant_factors_needed_to_manage_organisational_resilience (accessed on 3 February 2022).
3. Rožman, M.; Peša, A.; Rajko, M.; Štrukelj, T. Building Organisational Sustainability during the COVID-19 Pandemic with an Inspiring Work Environment. *Sustainability* **2021**, *13*, 1747. Available online: https://www.researchgate.net/publication/355506833_Building_Organisational_Sustainability_during_the_COVID-19_Pandemic_with_an_Inspiring_Work_Environment (accessed on 20 February 2022). [CrossRef]
4. Sensier, M.; Bristow, G.; Healy, A. Measuring Regional Economic Resilience across Europe: Operationalising a complex concept. *Spat. Econ. Anal.* **2016**, *11*, 128–151. [CrossRef]
5. Sabatino, M. Competitiveness and Resilience of the Productive Districts in Sicily. The Behavior of the Sicilian Production Areas during the Economic Crisis. *Contemp. Econ.* **2016**, *10*, 233–248. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3170208 (accessed on 3 February 2022). [CrossRef]
6. Cruz-Castro, L.; Holl, A.; Rama, R.; Sanz-Menéndez, L. Economic crisis and company R&D in Spain: Do regional and policy factors matter? *Ind. Innov.* **2017**, *25*, 1–23. Available online: https://www.tandfonline.com/doi/full/10.1080/13662716.2017.1355231 (accessed on 4 February 2022). [CrossRef]
7. ec.europa.eu. Available online: https://ec.europa.eu/info/sites/default/files/file_import/european-semester_thematic-factsheet_undeclared-work_en.pdf (accessed on 24 February 2022).
8. Di Pietro, F.; Lecca, P.; Salotti, S. Regional Economic Resilience in the European Union: A Numerical General Equilibrium Analysis JRC Working Papers on Territorial Modelling and Analysis. 2020. Available online: https://joint-research-

centre.ec.europa.eu/publications/regional-economic-resilience-european-union-numerical-general-equilibrium-analysis_en (accessed on 3 February 2022).
9. Van Bergeijk, P.A.G.; Brakman, S.; van Marrewijk, C. Heterogeneous economic resilience and the great recession's world trade collapse. *Pap. Reg. Sci.* **2017**, *96*, 3–12. [CrossRef]
10. Rose, A. Defining and Measuring Economic Resilience to Disasters. *Disaster Prev. Manag.* **2004**, *13*, 307–314. Available online: https://www.researchgate.net/publication/242339162_Defining_and_Measuring_Economic_Resilience_to_Disasters (accessed on 5 February 2022). [CrossRef]
11. Rose, A. Economic Resilience to Natural and Man-Made Disasters: Multidisciplinary Origins and Contextual Dimensions. *Environ. Hazards* **2007**, *7*, 383–398. Available online: https://www.researchgate.net/publication/223098001_Economic_Resilience_to_Natural_and_Man-Made_Disasters_Multidisciplinary_Origins_and_Contextual_Dimensions (accessed on 5 February 2022). [CrossRef]
12. Angulo, A.; Mur, J.; Trivez, F.J. Measuring resilience to economic shocks: An application to Spain. *Ann. Reg. Sci.* **2018**, *60*, 349–373. Available online: https://www.researchgate.net/publication/313811375_Measuring_resilience_to_economic_shocks_an_application_to_Spain (accessed on 3 February 2022). [CrossRef]
13. Duval, A.R.; Vogel, L. Economic Resilience to Shocks: The Role of Structural Policies. *OECD J. Econ. Stud.* **2008**, *44*, 1–38. Available online: https://www.researchgate.net/publication/227361361_Economic_Resilience_to_Shocks_The_Role_of_Structural_Policies (accessed on 18 February 2022). [CrossRef]
14. Bristow, G.; Healy, A. Innovation and Regional Economic Resilience: An Exploratory Analysis. *Ann. Reg. Sci.* **2018**, *60*, 1–20. Available online: https://www.researchgate.net/publication/318715654_Innovation_and_regional_economic_resilience_an_exploratory_analysis (accessed on 5 February 2022). [CrossRef]
15. Van den Berg, M.; Jaarsma, M. What drives heterogeneity in the resilience of trade: Firm-specific versus regional characteristics. *Pap. Reg. Sci.* **2016**, *96*, 13–32. [CrossRef]
16. Pontarollo, N.; Serpieri, C. A composite policy tool to measure territorial resilience capacity. *Socio-Econ. Plan. Sci.* **2020**, *70*, 100669. [CrossRef]
17. Davies, S. Regional Resilience in the 2008–2010 Downturn: Comparative Evidence from European Countries. *Camb. J. Reg. Econ. Soc.* **2011**, *4*, 369–382. [CrossRef]
18. Fingleton, B.; Garretsen, H.; Martin, R. Recessionary Shocks and Regional Employment: Evidence on the Resilience of U.K. Regions. *J. Reg. Sci.* **2012**, *52*, 109–133. Available online: https://www.researchgate.net/publication/228288108_Recessionary_Shocks_and_Regional_Employment_Evidence_on_the_Resilience_of_UK_Regions (accessed on 15 February 2022). [CrossRef]
19. Gardiner, B.; Martin, R.; Sunley, P.; Tyler, P. Spatially unbalanced growth in the British economy. *J. Econ. Geogr.* **2013**, *13*, 889–928. [CrossRef]
20. Bristow, G.; Healy, A. Crisis Response, Choice and Resilience: Insights from Complexity Thinking. *Camb. J. Reg. Econ. Soc.* **2015**, *8*, 241–256. Available online: https://www.researchgate.net/publication/276924527_Crisis_response_choice_and_resilience_Insights_from_complexity_thinking (accessed on 4 February 2022). [CrossRef]
21. Griffith-Jones, S.; Tanner, T. Financial Crises and Economic Resilience: Lessons for Disaster Risk Management and Resilience Dividends. In *Realising the 'Triple Dividend of Resilience'*; Surminski, S., Tanner, T., Eds.; Springer International Publishing: New York, NY, USA, 2016; pp. 151–172. Available online: https://www.researchgate.net/publication/311169989_Financial_Crises_and_Economic_Resilience_Lessons_for_Disaster_Risk_Management_and_Resilience_Dividends#fullTextFileContent (accessed on 8 February 2022). [CrossRef]
22. Doran, J.; Fingleton, B. Employment Resilience in Europe and the 2008 Economic Crisis: Insights from Micro-Level Data. *Reg. Stud.* **2016**, *50*, 644–656. [CrossRef]
23. Dissart, J.C. Regional Economic Diversity and Regional Economic Stability: Research Results and Agenda. *Int. Reg. Sci. Rev.* **2003**, *26*, 423–446. Available online: https://www.researchgate.net/publication/249682405_Regional_Economic_Diversity_and_Regional_Economic_Stability_Research_Results_and_Agenda (accessed on 5 February 2022). [CrossRef]
24. Christopherson, S.; Michie, J.; Tyler, P. Regional resilience: Theoretical and empirical perspectives. *Camb. J. Reg. Econ. Soc.* **2010**, *3*, 3–10. Available online: https://academic.oup.com/cjres/article/3/1/3/340777 (accessed on 5 February 2022). [CrossRef]
25. Davies, A.; Tonts, M. Economic Diversity and Regional Socioeconomic Performance: An Empirical Analysis of the Western Australian Grain Belt. *Geogr. Res.* **2009**, *48*, 223–234. [CrossRef]
26. Tsiapa, M.; Batsiolas, I. Firm resilience in regions of Eastern Europe during the period 2007–2011. *Post-Communist Econ.* **2019**, *31*, 19–35. [CrossRef]
27. Giannakis, E.; Bruggeman, A. Economic crisis and regional resilience: Evidence from Greece. *Pap. Reg. Sci.* **2015**, *96*, 451–476. Available online: https://www.researchgate.net/publication/288073640_Economic_crisis_and_regional_resilience_Evidence_from_Greece (accessed on 5 February 2022). [CrossRef]
28. Giannakis, E.; Bruggeman, A. Regional disparities in economic resilience in the European Union across the urban–rural divide. *Reg. Stud.* **2019**, *54*, 1200–1213. Available online: https://www.tandfonline.com/doi/full/10.1080/00343404.2019.1698720 (accessed on 5 February 2022). [CrossRef]
29. Bertschek, I.; Polder, M.; Schulte, P. ICT and resilience in times of crisis: Evidence from cross-country micro moments data. *Econ. Innov. New Technol.* **2019**, *28*, 759–774. Available online: https://www.tandfonline.com/doi/full/10.1080/10438599.2018.1557417 (accessed on 8 February 2022). [CrossRef]

30. Angulo, A.; Mur, J.; Trivez, J. Measure of the resilience to Spanish economic crisis: The role of specialization. *Econ. Bus. Lett.* **2014**, *3*, 263–275. Available online: https://reunido.uniovi.es/index.php/EBL/article/view/10419/10125 (accessed on 3 February 2022). [CrossRef]
31. Đokić, I.; Fröhlich, Z.; Rašić Bakarić, I. The impact of the economic crisis on regional disparities in Croatia. *Camb. J. Reg. Econ. Soc.* **2016**, *9*, 179–195. Available online: https://www.econstor.eu/bitstream/10419/124317/1/ERSA2014_00455.pdf (accessed on 5 February 2022). [CrossRef]
32. Cuadrado-Roura, J.R.; Maroto, A. Unbalanced regional resilience to the economic crisis in Spain: A tale of specialisation and productivity. *Camb. J. Reg. Econ. Soc.* **2016**, *9*, 153–178. Available online: https://www.researchgate.net/publication/299458006_Unbalanced_regional_resilience_to_the_economic_crisis_in_Spain_A_tale_of_specialisation_and_productivity (accessed on 5 February 2022). [CrossRef]
33. Webber, D.J.; Healy, A.; Bristow, G. Regional Growth Paths and Resilience: A European Analysis. *Econ. Geogr.* **2018**, *94*, 355–375. Available online: https://eprints.whiterose.ac.uk/160635/8/G%20Bristow%20A%20Healy%20regional%20growth%20paths%20postprint.pdf (accessed on 8 February 2022). [CrossRef]
34. Capello, R.; Caragliu, A.; Fratesi, U. Spatial heterogeneity in the costs of the economic crisis in Europe: Are cities sources of regional resilience? *J. Econ. Geogr.* **2015**, *15*, 951–972. [CrossRef]
35. Dimian, G.; Apostu, S.A.; Vasilescu, D.; Aceleanu, M.I.; Jablonsky, J. Vulnerability and Resilience in Health Crises. Evidence from European Countries. *Technol. Econ. Dev. Econ.* **2021**, *27*, 783–810. Available online: https://journals.vilniustech.lt/index.php/TEDE/article/view/14753/10508 (accessed on 14 February 2022). [CrossRef]
36. Ghosh, S.; Mastromarco, C. Exports, immigration and human capital in US states. *Reg. Stud.* **2018**, *52*, 840–852. Available online: https://www.tandfonline.com/doi/pdf/10.1080/00343404.2019.1698720 (accessed on 14 February 2022). [CrossRef]
37. Petrakos, G.; Psycharis, Y. The spatial aspects of economic crisis in Greece. *Camb. J. Reg. Econ. Soc.* **2016**, *9*, 137–152. [CrossRef]
38. Di Caro, P.; Fratesi, U. Regional determinants of economic resilience. *Ann. Reg. Sci.* **2018**, *60*, 235–240. Available online: https://link.springer.com/content/pdf/10.1007/s00168-017-0858-x.pdf (accessed on 14 February 2022). [CrossRef]
39. Caldera Sánchez, A.; Rasmussen, M.; Röhn, O. Economic Resilience: What Role for Policies? *J. Int. Commer. Econ. Policy* **2016**, *7*, 1650009. [CrossRef]
40. Mattas, K.; Tsakiridou, E. Shedding fresh light on food industry's role: The recession's aftermath. *Trends Food Sci. Technol.* **2010**, *21*, 212–216. Available online: https://www.academia.edu/26896285/Shedding_fresh_light_on_food_industrys_role_the_recessions_aftermath (accessed on 14 February 2022). [CrossRef]
41. Williams, N.; Vorley, T.; Ketikidis, P.H. Economic resilience and entrepreneurship: A case study of the Thessaloniki City Region. *Local Econ.* **2013**, *28*, 399–415. [CrossRef]
42. Jang, J.S.R. ANFIS Adaptive-Network-based Fuzzy Inference System. *IEEE Trans. Syst. Man Cybern.* **1993**, *23*, 665–685. Available online: https://www.researchgate.net/publication/3113825_ANFIS_Adaptive-Network-based_Fuzzy_Inference_System (accessed on 23 February 2022). [CrossRef]
43. Sugeno, M. *Industrial Applications of Fuzzy Control*; Elsevier Science Ltd.: New York, NY, USA, 1985.
44. Brlečić Valčić, S. Utilisation of ANFIS in analysing impact of cost structure on Croatian maritime companies development. *Pomorstvo* **2021**, *35*, 179–185. Available online: https://hrcak.srce.hr/file/377153 (accessed on 3 February 2022). [CrossRef]
45. Brlečić Valčić, S.; Samodol, A.; Valčić, M. Using ANFIS in joint dynamics of monetization, financial development, public debt and unemployment analysis. *Ekon. Vjesn. Rev. Contemp. Entrep. Bus. Econ. Issues* **2021**, *34*, 23–40. Available online: https://hrcak.srce.hr/file/377941 (accessed on 3 February 2022). [CrossRef]
46. Čiča, Đ.; Zeljković, M.; Tešić, S. Dynamical contact parameter identification of spindle-holder-tool assemblies using soft computing techniques. *Facta Univ. Ser. Mech. Eng.* **2020**, *18*, 565–577. Available online: http://casopisi.junis.ni.ac.rs/index.php/FUMechEng/article/view/5750 (accessed on 8 November 2022). [CrossRef]
47. Abdulshahed, A.M.; Badi, I. Prediction and control of surface roughness for end milling process using ANFIS. *Oper. Res. Eng. Sci. Theory Appl.* **2018**, *1*, 1–12. Available online: https://www.researchgate.net/publication/329811425_PREDICTION_AND_CONTROL_OF_SURFACE_ROUGHNESS_FOR_END_MILLING_PROCESS_USING_ANFIS (accessed on 8 November 2022). [CrossRef]