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FINANCIALISATION OF EUROPEAN UNION COUNTRIES - AN ATTEMPT TO DETERMINE DIFFERENTIATION THROUGH CLUSTER ANALYSIS**Tomasz Florczak***Institute of Finance, Faculty of Economics and Sociology, University of Lodz, Lodz, Poland**E-mail: tomasz.florczak@uni.lodz.pl**Received 18 November 2023; accepted 24 February 2024; published 30 March 2024*

Abstract. The process of increasing the importance of the financial sector in the economy is referred to as financialisation. This process can be observed in many sectors of the economy. The article aimed to identify the differentiation in the financialisation of European Union countries. The article verified the research hypothesis according to which the differentiation of EU countries due to financialisation, determined using cluster analysis, consent with the division into groups of countries according to geographical criteria. The k-means cluster analysis method was used to assign countries to individual groups. Six variables were adopted for the research (the ratio of the current level of budget balance to GDP, the ratio of public debt to GDP, the ratio of public expenditure to GDP, the ratio of household debt to GDP, the ratio of household consumption expenditure to GDP, the investment rate of non-financial enterprises). Based on the average values of indicators for the period 2011-2021, EU countries were assigned to characteristic groups differing in the specificity of financialisation. The results indicate that the countries of Central and Eastern Europe were classified into one cluster, while the countries of Southern Europe were classified into two separate clusters. It seems essential to classify the countries of Western Europe and Northern Europe into one cluster. The literature on the subject includes studies of financialisation and its impact on the economy. However, it is difficult to find studies that divide countries according to characteristics related to financialisation.

Keywords: financialisation; EU countries; k-means method; differentiation of financialisation

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JEL Classifications: G21, G23, G30

1. Introduction

Since the financial crisis on the subprime loan market, attention has been drawn to the increasing importance of the financial sector in the economy, which is referred to as financialisation (French et al., 2011). The crisis mentioned above highlighted the process of financialisation and its impact on the economy. However, the beginnings of financialisation can be traced back to the late 1950s. At that time, the economy began to be described by two values: risk and profitability. This approach developed over the following years and became the reason for reducing systemic security (Szczepankowski, 2015). Another manifestation of financialisation can be defined as a decrease in importance (in the 1970s) (Villani, 2021) and the subsequent collapse of the Bretton-Woods system (Vogl, 2012). The reason for these events was the introduction of an innovative solution by commercial banks, which was the convertibility of US dollars into euros and then the euro into currencies of European countries (Dembinski, 2011). Combined with the collapse of the Bretton-Woods system, this created market instability that resulted in flexible exchange rates. Using such exchange rates resulted in the lack of a

price reference, which was previously gold. Market changes fostered market uncertainty and volatility. This resulted in high costs of securing investments. The desire to reduce these costs favoured the creation of new financial instruments that reduced currency risk (Ma & Ji, 2023). Such an instrument were currency futures contracts, which hedged possible differences in currency prices in different periods. Using these instruments enabled the creation of a speculative market that allowed profits to be made through the differences between real prices and those resulting from derivative instruments (Vogl, 2012).

Changes in the financial sector have increased the role of financiers, financial institutions, financial instruments, interest rates and profitability of enterprises in the economy (Sokol, Pataccini, 2020). The second half of the 20th century was characterised by the spread of financialisation in the economy. Innovations and new financial instruments on commodity markets favoured this phenomenon (Zaremba, 2015).

The financialisation process is often discussed in the literature on the subject. However, it is difficult to find research focusing on the similarities and differences in the financialisation of individual countries. For this reason, it seems essential to address the issue of countries' differentiation due to the increasing importance of the financial sector in the economy. The diversity of financialisation can be defined in many ways. Various research methods can be used depending on the selected part of the economy affected by the financial sector. The article aims to identify the differences in the financialisation of EU countries. The research was carried out using selected indicators describing financialisation, which made it possible to specify groups of countries with similar characteristics related to financialisation. The division of entities into groups was researched using taxonomic methods (cluster analysis) (Pfeifer, 2007).

The research sample consisted of European Union Member States, a group of developed and developing countries. When examining the European Community, geographical division is used (Western Europe, Southern Europe, Northern Europe, Central and Eastern Europe). This division also corresponds to the differences between the financial sectors of the researched countries. For this reason, it seems essential to research the division of EU countries in terms of the financialisation of the economy. Therefore, the article verified the research hypothesis that the differentiation of EU countries due to financialisation, determined using cluster analysis, consent with the division according to the geographical criterion:

- Western European countries: Austria, Belgium, France, the Netherlands, Ireland, Luxembourg, Germany,
- Central and Eastern European countries: Bulgaria, Czech Republic, Croatia, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia, Slovenia, Hungary,
- Northern European countries: Denmark, Finland, Sweden,
- Southern European countries: Cyprus, Greece, Spain, Malta, Portugal, Italy.

The following parts of the article introduce the concept of financialisation. The methodology for researching the differentiation of financialisation is described, and the adopted variables are indicated. Then, the research results were presented and explained. The last part discusses the results obtained and a summary of the research conducted.

2. Review of literature

The increasing importance of the financial sector in the economy is most often referred to as financialisation. Many definitions describing this process can be found in the literature on the subject. Some describe this process as an increase in the importance of the financial sector and its primacy over other sectors of the economy (Gołębiowski, Szczepankowski, 2015). Others define it as the domination of the financial sector highlighted by the growing role of financial motives (Jajuga, 2014), financial markets, and financial institutions in the functioning of national and international economies (Epstein, 2005). The development of financialisation is facilitated by disseminating the tendency to make profits using financial channels rather than from production activities (Krippner, 2011).

Financialisation is linked to globalisation, as demonstrated by the spread of the 2007 financial crisis to the economies of subsequent developed and developing countries (Lapavitsas, Soydan, 2022). Both processes (financialisation and globalisation) have become an element of the neoliberal doctrine, in which the market is identified as perfectly competitive, efficient, stable and self-regulating, enabling the allocation of savings and capable of creating wealth (Urban, 2020). The development of financialisation was favoured by the deregulation of the financial sector (Knafo, 2022), which was carried out as part of the neoliberal variant of the economy (Mader, 2014).

The literature on the subject distinguishes three models of the development of financialisation. The first includes increased profits from non-trading operations, which results from the focus on added value for shareholders and its accumulation. The second one indicates that an increase in the share of profits in state revenues accompanies the development of financialisation. The last model concerns the focus on profitable investments, growth of cash flows and consumer credit (van Treeck, 2007).

The current form of financialisation results from changes that began at the end of the 20th century in the global approach to economics. The increasing importance of the financial sector in the economy resulted in a transition from an economic model based on the production of goods to an economy focused on financial indicators (Davis, Kim, 2015). Financialisation can be observed at the level of the financial sector, non-financial enterprises and households (Jain, Gabor, 2020).

Financialisation in the financial sector is developing by creating new types of institutions and financial instruments. The newly created instruments have an extensive and diverse structure, making assigning them to prudential regulations difficult. The financial market is also characterised by securitisation, which enables the conversion of assets into financial flows (Pemberton, 2021). It applies, among others, to the case of mortgage loans, which can be converted on the bank's balance sheet into securities secured by cash flows from the repayment of loan instalments. Thanks to this, the bank obtains funds to increase lending. The investor who purchased these securities has a guarantee of return of funds, with the security being the loan repayment by the bank's client (Schwartz, 2020).

It should be noted that non-financial companies' activities are assessed mainly using calculation methods, i.e., financial balances, rate of return, and profitability. These values do not influence investment decisions in a given enterprise but are the basis for assessing how the enterprise is managed (Bracking, 2012). For potential investors, these indicators may be the basis for committing their funds to the activities of a given company (Cordeiro Santos, 2023). Therefore, non-financial companies are increasingly directing their activities towards operations on the financial market, which in the short term may bring more significant profits than the development of operational activities (Barradas, Lakhani, 2023).

Financialisation is, therefore, causing significant changes in the non-financial companies' sector. Profits from the business were invested in the company's development, and now, these funds are increasingly used to invest in financial assets (Schwan, 2021). These activities resulted in slower employment growth and wages in non-financial companies. However, the differences in profit achieved in financial and non-financial activities decreased (Soener, 2021). Running the economy according to neoclassical and Keynesian ideas, combined with the process of financialisation, enabled the emergence of global corporations, whose market dominance became visible in the 21st century (Correia, Barradas, 2021).

The increasing importance of the financial sector can also be observed in the household sector. Household members' investments are often related to retirement plans, which should protect their future living costs. These funds, taking into account various models of the pension system, are invested by intermediary organisations on international financial markets (Austen et al., 2022). The risk of these investment activities is held by households whose members may be unaware of all the associated risks (Mandelkern, Rosenhek, 2022). In this way, trends in the economy spread to smaller and smaller entities operating in the economy (Wiess, 2015). Financialisation also manifests in households through widespread access to credit money (Sparkes, Wood, 2021). Easier access to credit financing for excessive consumption favours household debt. Consumer spending increases with a

simultaneous increase in inequality between income and the distribution of financial resources (Martínez, Borsari, 2022).

Financialisation permeates various sectors of the economy. Consequently, it is challenging to point to the definition of financialisation for all research topics. Some authors focus on the financial or individual economic sectors in which financialisation occurs. Therefore, it is essential to identify a definition of financialisation that is valid for this article. The author has adopted an approach related to the role of the financial sector in the economy. According to the definition current for this study, financialisation is a long-term process characterised by the growth of the banking sector and its impact on the real sphere of the economy.

3. Cluster analysis – brief description

This research aimed to identify the differences in the financialisation of EU countries, which illustrates the assignment of the studied countries based on similarities in financialisation indicators. The classification of entities or objects is the subject of research in taxonomy (knowledge of the principles of ordering) (Gatnar, 1998). The use of quantitative methods in research in this field is referred to as cluster analysis. Using methods from this group is essential when using databases containing multidimensional variables (taking into account entities, indicators describing them, and various periods showing values for these indicators) (Migdał-Najman, Najman, 2013). Therefore, cluster analysis grouping methods, a branch of multivariate statistics (Buszkowska, 2016), can be used to examine the diversity of financialisation.

Several cluster analysis methods exist in the subject literature (Kopczewska et al., 2016). Their basic division most often includes hierarchical methods (during grouping, it creates a class tree, in which single "leaves" symbolise each research entity, and the "nodes" of the classification tree are sets of entities) and non-hierarchical methods (assign entities to several clusters specified by the researcher, which affects the quality of the obtained grouping) (Lotko, Lotko, 2015).

Non-hierarchical methods are divided into methods creating inseparable clusters (one entity may belong to more than one cluster) and optimisation-iterative methods (creating a k-class structure optimal due to a specific division quality criterion). The k-means algorithm is a popular non-hierarchical method in which cluster membership is calculated to minimise intern-group variability (Rozkrut, Rozkrut, 2014).

The first version of the k-means method, including the function of dividing entities into k-groups based on a one-dimensional variable with a normal distribution, was presented by D. R. Cox (Balon, Dziadkowiec, 2015). However, the division of random selection of entities for distinguished groups was studied by J. McQueen, who is credited for the authorship of this method (Pietrzykowski, Kobus, 2006). The object of analysis in this method are j-objects, which are described by i-variables. This algorithm aims to divide the studied entities into k-clusters optimally. The basis of this method is the iterative assignment of objects to the number of k-clusters determined by the researcher (Skikiewicz, 2011). This method determines the distances between entities using the Euclidean distance (Sobolewski, Sokołowski, 2017).

The sequence of actions in the classic variant of the k-means method first includes determining the number of clusters and the number of iterations in which improvements are made. Then, the centres of gravity of the initial clusters of entities are determined (Panek, 2009):

$$O_{ic} = [z_{icj}] = \bar{O}_r = \frac{1}{n_r} \sum_{i=1}^{n_r} O_j$$

$r=1,2, \dots, z,$

z_{icj} – the value of the j-th variable for the i^c -th center of gravity of a given cluster of entities,

O_j – the value of the j-th variable for the O-th entity.

Entities are assigned to individual clusters based on the entity's distance from the centre of gravity. The assignment is based on the smallest distance to the centre of gravity of individual clusters. At further stages of

the research, the assignment of entities to clusters is improved iteratively. In this way, the configuration of clusters of examined entities is optimised. Subsequent iterations strive to minimise the clustering error. These processes are accomplished by calculating the change in clustering error for the first entity. The change in clustering error results from classifying into subsequent clusters different from the one to which this entity is currently assigned. The value of the change in the clustering error determines whether the examined entity should be left in the cluster to which it now belongs. If not, the entity should be moved to another cluster. If no entity is moved to another cluster in any of the iterations, it means that the optimal division into k-clusters has been achieved. The results of applying cluster analysis are sensitive to the quality of the data accepted for the research. For this reason, outlying observations that may distort the algorithm's operation should be removed from the examined database (Rogalewicz, Kujawińska, 2016).

4. Research objective and methodology

The research on the differentiation of financialisation covered 27 European Union countries. This is a group of countries with diversified economic characteristics and a degree of financial sector development. Taking all countries from this group into the research makes it possible to identify similarities between countries based on indicators describing financialisation. Due to data availability, the research period was 2011-2021.

The research aimed to identify the differentiation of financialisation of EU countries, which illustrates the classification of the studied countries based on similarities in financialisation indicators. The k-means method was used to achieve this goal. For the described method, it was assumed that the studied group of countries would be divided into 5 clusters selected in a maximum of 10 iterations. The geographical division of the EU includes 4 groups, but the adopted number of clusters results from the specificity of some EU countries that may create separate clusters (e.g. Cyprus, Luxembourg, Greece). Based on the statistical description, it is possible to indicate the characteristics of individual clusters (i.e. high or low average value of specific variables for a given cluster). However, it is impossible to distinguish which cluster has the highest financialisation. To indicate which cluster is characterised by the highest financialisation, the zeroed unitarisation method was used based on the range between the maximum and minimum value of the indicator (Balcerzak, 2015).

Both methods are sensitive to the quality of the data received. Therefore, 15 variables were initially adopted to research the differentiation of financialisation (the ratio of the current level of budget balance to GDP, the ratio of public debt to GDP, the ratio of public expenditure to GDP, the ratio of financial sector deposits to GDP, the ratio of private sector debt to GDP, the ratio financial sector assets to GDP, ratio of employment in the financial sector to total employment, ratio of assets of the non-financial companies sector to GDP, ratio of gross debt to capital for non-financial companies, ratio of debt of non-financial companies to their capital, investment rate of non-financial companies, ratio of household consumption expenditure to GDP, ratio of household debt to GDP, ratio of household debt to its income, household savings rate), which were subject to standardisation (Rogalewicz, Kujawińska, 2016), research of variability of characteristics, research of correlation of variables (using an inverse correlation matrix) and research due to the descriptive statistics of the distribution (Panek, 2009). On this basis, six variables were adopted for the study at last: the ratio of the current level of the budget balance to GDP (the budget deficit favours external financing of budget expenditure), the ratio of public debt to GDP (a high ratio of public debt to GDP shows the important role of servicing the debt incurred by the state so far and high demand for external financing), the ratio of public expenditure to GDP (illustrates the amount of expenditure in the economy, the higher the expenditure, the higher financialisation), the ratio of household debt to GDP (illustrates the level of dependence of households on financing with credit money), the ratio of household consumption expenditure to GDP (the higher consumer spending, the higher the demand for financing with credit money, which can replace the increase in wages in the economy), investment rate of non-financial companies (investment expenditure of non-financial companies influence the rise in interest of external financing).

The research of EU countries' financialisation differentiation using average values of variables for the analysed period 2011-2021 included the following stages:

1. Calculation of average values of indicators in 2011-2021.
2. Transformation of destimulant and nominant into stimulants.

3. Checking whether the averaged variables meet the conditions for admission to the test.
4. Application of the k-means cluster analysis algorithm (division of EU countries into 5 clusters).
5. Indication of the characteristics and average degree of financialisation of individual clusters.

The next part of the article presents the results of the conducted research. There was also a discussion about the results obtained and their comparison with the research results in the literature on the subject.

4. Results and discussion

Results

Based on the values of six variables (the ratio of the current level of budget balance to GDP, the ratio of public debt to GDP, the ratio of public expenditure to GDP, the ratio of household debt to GDP, the ratio of household consumption expenditure to GDP, the investment rate of non-financial companies), the composition of five clusters was determined for the period 2011-2021. The results of the research are presented in Table 1 below. The cluster numbers indicated in the table do not mean that cluster no. 1 is the best and cluster no. 5 is the worst. They only serve as a name and facilitate their identification. Clusters are distinguished based on characteristics resulting from the average values of variables describing these groups. The table below shows the characteristics of individual clusters and the countries assigned to a given cluster using the k-means method.

Table 1. Assignment of EU countries to characteristic clusters in 2011-2021 based on average values of variables for the entire period

Cluster name	Characteristics of the cluster	Countries assigned to the cluster
Cluster No. 1	The cluster is characterised by a high average: ratio of public expenditure to GDP; ratio of household debt to GDP. The cluster is characterised by a low average: ratio of the current level of budget balance to GDP	Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden
Cluster No. 2	The cluster is characterised by a high average: the ratio of the current level of budget balance to GDP; public debt to GDP ratio; ratio of public expenditure to GDP; ratio of household consumption expenditure to GDP. The cluster is characterised by a low average: investment rate of non-financial companies (% of GDP).	Greece, Italy
Cluster No. 3	The cluster is characterised by a high average: investment rate of non-financial companies (% of GDP) The cluster is characterised by a low average: ratio of public expenditure to GDP; ratio of household consumption expenditure to GDP	Ireland
Cluster No. 4	The cluster is characterised by a low average: the ratio of the current level of budget balance to GDP; public debt to GDP ratio; ratio of household debt to GDP. The average values of the remaining variables are relatively low.	Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia
Cluster No. 4	The cluster is characterised by a high average: the ratio of the current level of budget balance to GDP; ratio of household consumption expenditure to GDP; ratio of household debt to GDP. The cluster is characterised by a low average: investment rate of non-financial companies (% of GDP).	Cyprus, Portugal, Spain

Source: Based on research conducted by the author in the PS IMAGO PRO 5.1 - IBM SPSS program using data from the Eurostat Database

The table above contains information about the five clusters created using the k-means method. The basis for assigning countries to individual clusters was six variables adopted for the research.

Cluster No. 1 was characterised by a high average value of the ratio of public expenditure to GDP and the ratio of household debt to GDP. This cluster had a low average value of the current budget balance to GDP ratio. Countries assigned to this cluster are characterised by relatively high public expenditure and household debt. The following were assigned to this cluster: Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden. Some of these countries can be attributed to Western European countries (Austria, Belgium, France, Germany, Luxembourg, the Netherlands), while the other half are Northern European countries (Denmark, Finland, Sweden). These countries belong to the group of developed countries and may be characterised by similar financialisation results.

Greece and Italy were assigned to cluster no. 2. This cluster was characterised by a high average of the ratio of the current level of budget balance to GDP, the ratio of public debt to GDP, the ratio of public expenditure to GDP, and the ratio of household consumption expenditure to GDP. These countries also have a relatively low rate of investment by non-financial companies (% of GDP). According to this characteristic, investments in the economies of the countries of cluster 2 are lower compared to the countries belonging to the other clusters. The high average values of indicators characteristic of this cluster take into account the specificity of the economies of the researched countries.

An interesting case is cluster no. 3, to which Ireland was assigned. Countries like Cyprus, Greece or Luxembourg could be assigned to a separate cluster. However, due to the variables adopted for the research (performed statistical tests indicated the rejection of variables describing the banking sector and most of the variables describing the non-financial companies' sector), Ireland turned out to be a country with characteristics different from the other countries under research. Referring to the indicators adopted in the research, this country was characterised by a high average investment rate of non-financial companies, with a low average ratio of public expenditure to GDP and the ratio of household consumption expenditure to GDP. This means relatively large development investments are carried out in the country's economy. An excessive increase in public spending and household consumption expenditure does not accompany higher investment expenditure.

In cluster no. 4, one can notice a low average ratio of the current level of budget balance to GDP, the ratio of public debt to GDP and household debt to GDP. This group includes Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia. Most of these are Central and Eastern European countries, which have characteristics similar to the description of this cluster. An interesting case is Malta, which was also classified in this group. The reasons for this classification may vary.

For this reason, it is worth paying attention to the degree of each of the analysed indicators in each country assigned to this cluster. When constructing the synthetic financialisation index (with use of zeroed unitarisation method), six variables adopted for the research were used. The indicator determined using the zeroed unitarisation method allowed to determine the average level of financialisation of the examined cluster. Considering this indicator's level, Malta is in the middle of the cluster (it's neither the highest nor the lowest financialisation in this cluster). This means that in terms of financialisation, Malta is similar to Central and Eastern European countries.

The last clusters obtained consisted of Cyprus, Portugal and Spain. These countries are classified in the literature as Southern Europe. Cluster No. 5 was characterised by a high average ratio of the current level of budget balance to GDP, the ratio of household consumption expenditure to GDP, and the ratio of household debt to GDP. A low average investment rate of non-financial companies also characterised this cluster. This means that in the countries belonging to this cluster, many budget expenditures exceed the accumulated budget revenues. This occurs amid household consumer spending and a low investment rate by non-financial companies. These countries are characterised by high financialisation.

To check the level of financialisation in the researched clusters, research was carried out using the zeroed unitarisation method. It took into account six variables adopted for the research. The results indicating the level of financialisation of the researched clusters are illustrated in Figure 1.

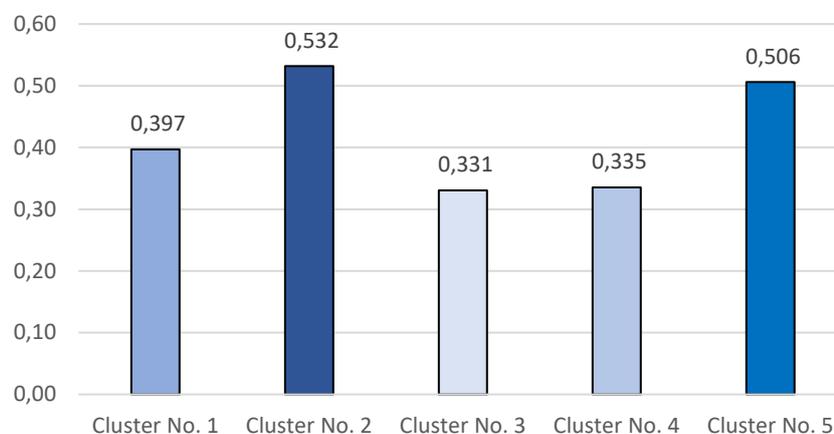


Figure 1. The degree of financialisation in clusters determined using the k-means method
Source: Based on research conducted by the author using data from the Eurostat Database.

The information contained in Chart No. 1 indicates that cluster no. 2 is characterised by the highest financialisation (synthetic indicator equal to 0.532). The countries assigned to this cluster are Greece and Italy. The financialisation of these countries' economies seems consistent with their specificity. Slightly lower financialisation characterises cluster no. 5 (synthetic indicator: 0.506), which consists of three countries: Cyprus, Portugal and Spain. As in the case of cluster no. 2, the level of financialisation corresponds to the specificity of the countries examined. The lowest financialisation characterises clusters no. 3 and 4. It should be noted that cluster no. 3 covers only Ireland, which was assigned to a separate cluster due to the average values of the studied variables. Cluster no. 4 consists mainly of Central and Eastern European countries (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia). Due to historical economic changes, these countries have quite similar characteristics. Cluster no. 1 covers most of the countries of Western Europe and the countries of Northern Europe. They are characterised by average financialisation (synthetic index equal to 0.397). Regarding the level of financialisation, the research results confirm the characteristics of each group of countries.

Discussion

The research on the financialisation of the financial sector gained importance after 2007 (the beginning of the financial crisis). Stockhammer (2010) researched financialisation in the USA, Anglo-Saxon and European countries. This research aimed to determine the macroeconomic changes caused by financialisation. In particular, the focus was on determining this process's impact on the financial sector's stability and income distribution. In turn, J. Müller (2013) identified financialisation and the potential crisis of eurozone countries resulting from the crisis orders after 2008. It was found that the changes introduced to contain the crisis were aimed at restoring the financial sector's profitability. Looking at capitalist regions and/or national economies in Europe, the main result of financialisation may be, on the one hand, the decoupling of profits from production and, on the other hand, an increase in investment and wages. Moosa (2018) took a slightly different approach, whose research included presenting empirical evidence on the relationship between economic growth and financialisation measured by the ratio of credit to GDP and the ratio of publicly traded shares to GDP. Barradas (2020) also researched the relationship between the financial sector and economic growth. The research took into account Portugal in the years 1977-2016. The results of this research indicated that the financial (banking) sector has a negative impact on Portugal's economic growth.

The research described in this article included the identification of differentiation in the financialisation of EU countries in the period 2011-2021. The research used the k-means method, which divided the EU countries into characteristic clusters. Assigning countries to individual clusters based on the average values of indicators for the period 2011-2021 reduced the impact of results from a single year on the results obtained. On the other hand, research showing changes in the assignment to particular clusters during the period under research could indicate potential changes in the similarities in the financialisation of the countries under research. The literature on the subject contains studies relating to individual countries (e.g., Portugal and Poland). K. Ciuman's (2014) research included presenting the role of the financial sector in the economy, the essence of financialisation, and the relationship between financialisation and the insurance sector in Poland's example. The conclusions from these studies indicate that it is possible to transfer high-risk to the capital market through financial insurance instruments. Reducing the size of the operations of insurance companies and pension funds means that less cash is regularly directed to the financial market. Some authors studied groups of countries. Wrzesiński's (2014) research covered the USA, selected countries of Central and Eastern Europe and the euro zone countries. This research aimed to present the phenomenon of financialisation and its genesis, as well as to attempt a preliminary assessment. The financial sectors of selected Central and Eastern European countries were also researched by Gołębiowski and Szczepankowski (2015). They tried to assess the degree of financialisation of the economies of selected Central and Eastern European countries. It was pointed out that there are differences in assessing the scale of financialisation of Central and Eastern European countries depending on the adopted measure. It was also determined that this part of Europe is relatively small.

Referring to the specificity of financialisation research, most research focused on European countries and the United States. Some studies included countries in Asia and Africa. These studies concerned individual countries, comparisons of several countries, groups of countries or comparisons between groups. The size of the studied groups ranged from one (Ciuman, 2014; Barradas, 2020) to several countries (Müller, 2013).

The goals pursued in the analysed studies were varied. The common denominator of most of these goals was determining financialisation in the economies of the countries studied. These goals were achieved using ratio analysis (Stockhammer, 2010; Gostomski, 2014), unobserved components model (Moosa, 2018), and econometric analysis of time series (Barradas, 2020). In the subject literature, it is difficult to find studies that divide a group of countries into characteristic clusters due to financialisation. It should be noted that much research focuses on attempts to determine the level of financialisation or its impact on the economy.

For this reason, it seems justified to undertake research related to the division of European Union countries due to financialisation. The research of financialisation requires the use of research methods appropriate to the adopted goal and variables describing the growth of the financial sector adapted to the scope under research (e.g., economy, banking sector, insurance sector). Based on other authors' research, financialisation research can be continued using both parametric and non-parametric methods.

5. Conclusions

Since the financial crisis of 2007, attention has been paid to the increasing importance of the financial sector to other sectors of the economy. In the literature of the subject, this process is referred to as financialisation. The growth of the financial sector is observed, especially in developed and developing countries. This article discusses the topic of financialisation in the European Union countries. These countries constitute a heterogeneous group that may vary in terms of financialisation. Therefore, it was essential to research similarities in the financialisation of individual countries. The article aimed to identify the differentiation in the financialisation of EU countries, understood as the classification of the studied countries based on similarities in financialisation indicators. To achieve this goal, a five-stage research was carried out. The first three included determining the conditions for examining financialisation: variables, time sample, cross-sectional sample, and research methods. The following two stages focused on empirical research and interpretation of the obtained results.

The research on the differentiation in the financialisation of EU countries was carried out using the k-means method, taking into account six variables: the ratio of the current level of budget balance to GDP, the ratio of

public debt to GDP, the ratio of public expenditure to GDP, the ratio of household debt to GDP, the ratio of household consumption expenditure to GDP, investment rates of non-financial companies. The research based on the average values of indicators describing financialisation in 2011-2021 was intended to average the division results and indicate the assignment of countries to significantly different clusters. The use of such values reduced the impact of changes occurring from year to year in the economies of the countries under research. Verifying the research hypothesis based on the average values of the indicators, it can be seen that cluster no. 1 consists of most Western European countries and Northern European countries. The second cluster, which is similar to the geographical division, is cluster no. 4, consisting mostly of Central and Eastern European countries.

Interestingly, the Southern European countries were classified into two separate clusters no. 2 and 5. Based on the results obtained, the research hypothesis was partially positively verified. The clusters identified due to financialisation partially overlap with the groups of countries identified based on geographical criteria.

The results obtained indicate that the characterisation of countries by the financialisation of the economy does not coincide with the geographical breakdown. Relevant to the study of financialisation is the similarity of Luxembourg, a country characterised by an economy based on the financial sector, to some countries of Western Europe and Northern Europe. It's probably the result of using indicators describing the financialisation of different sectors of the economy. It is also interesting to note that Ireland is classified in a separate cluster. This indicates that the financialisation of this country's economy is differentiated from the rest of researched countries. In the literature, it isn't easy to find studies showing similarities in the financialisation of European Union countries. The results obtained make it possible to conduct further research in similar countries in the context of financialisation and make a division of EU countries not based on geographical criteria.

Examination of the differentiation of financialisation using the k-means cluster analysis method made it possible to determine characteristic groups of EU countries similar in financialisation. The results of the research depend on the adopted variables. For this reason, using different indicators or variables in absolute terms could produce different results. Paying attention to the variant of cluster analysis used, one can notice at least two possibilities. On the one hand, it would be essential to divide the data into more than five clusters using the k-means method. This research could lead to groups that differ more from each other than in the case of five clusters because the k-means method partitions by maximising the differences between clusters. It is possible that a larger number of clusters would reduce the number of countries assigned to individual clusters. This research may include a variety of results due to the number of clusters adopted.

On the other hand, other cluster analysis methods can be used. Interesting results could be obtained using agglomeration or deagglomeration methods, which show how the division into clusters was made. The results obtained using the k-means method are related to the limitations mentioned above. It seems essential to undertake research using a more significant number of clusters and other data describing further financialised sectors of the economy.

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