



REDISTRIBUTIVE POLICIES OF EU MEMBER COUNTRIES IN THE CONTEXT OF WELFARE REGIMES

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Abstract

This paper aims to use cluster analysis to monitor changes in the social regimes of EU countries in the context of their economic situation. In the first step, the paper provides an overview of theoretical studies and categorizes countries into individual social regimes based on available studies. Subsequently, hierarchical cluster analyses are performed for 2007 and 2019, one for a group of redistributive variables and one for socio-economic variables. The cluster analysis confirmed that differences among individual social regimes are blurred over time, and belonging to a social regime does not automatically lead to occurrence in the same cluster. The new and old member states are mixed in terms of redistributive variables, while economic differences among these countries are still present.

Keywords: Redistributive policy, welfare regimes, social equality, EU countries

JEL Classification: C01, I31, H53, R13

1. Introduction

Redistributive policies are an essential part of strategies to reduce inequalities and promote sustainable development in the economic, social and environmental dimensions. They are a powerful policy tool for improving equality among individuals as well as between the private and public sectors. They also have a significant impact on sustainable development, socio-economic context, financial stability, economic development, political inclusion, social mobility, as well as environmental sustainability (Kohler, 2015; Medved' and Nemec, 2011).

Equality achieved through appropriate redistribution can also help a country achieve sustainable economic growth (Berg and Ostry, 2011). On the other hand, inequality can slow progress in health, education as well as the country's preparedness to cope with

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significant shocks, which tend to lead to a slowdown in economic growth (Persson and Tabellini, 1994; Easterly, 2007; Berg *et al.*, 2012). This is confirmed by several studies (Bénabou, 2000, 2002; Bleaney *et al.*, 2001), which point out that some government expenditures, such as public investments in infrastructure, health expenditure, education, and social security, can be pro-growth and contribute to equality. Conversely, other public spending categories in redistributive policy may slow down economic growth (Izák, 2011). Thus, the macroeconomic effects of redistributive policies are likely to reflect the balance among the various components of the fiscal package (Ostry *et al.*, 2014). The degree of redistribution, which can affect the development of macroeconomic indicators of the country, is important too (Fišo and Buchtová, 2010).

While earlier international studies tended to identify the negative relationship between inequality and economic growth, the results became mixed due to the advent of panel-based methods. Li and Zou (1998) and Forbes (2000) contradict previous findings about the positive impact of inequality on economic growth. In contrast, Barro (2000) provides little indication of a clear relationship between inequality and growth in analysing panel data from different countries. However, the results also depend on the development level. Inequality hurts developing countries and has a positive impact on advanced economies. Castelló-Climent (2010) confirms the dependency on the development level but identifies an overall negative growth effect of income and human capital inequality. Voitchovsky (2005) enriches the debate by focusing on the shape of the income distribution. The study concludes that growth is promoted by imbalance at the top end of the income distribution but weakened by inequality at the bottom end. Halter *et al.* (2014) emphasize the time dimension of the inequality-growth relationship by showing that higher inequality fosters growth in the short term but hampers growth in the medium to long run. Hence, one explanation for the inconclusiveness of the literature is that estimates based on time-series variations pick up positive short-run effects of inequality, whereas methods that also exploit cross-country variations capture its negative impact in the medium to long run. A lasting positive outcome can occur when excluded people gain more and better access to resources and opportunities to participate in all spheres of public life (Krasota and Melnyk, 2020). The EU is also aware of this, and EU support for redistribution policies may require a different level or form of cross-border solidarity depending on the country (Charron and Bauhr, 2020).

Research of domestic and international redistribution (Alesina and Ferrara, 2005) suggests that a country's redistributive preferences can be derived partly from economic self-interest. Support should be stronger among citizens who rely on the welfare state and in countries with weak macroeconomic performance. These findings are also confirmed by the examples of EU countries, which differ in the size of income inequality

and the degree of redistribution (Bauhr and Charron, 2019; Stiglitz *et al.*, 2009; Antošová, 2019), which allows countries to be included in the selected social regime.

The social regime of a particular country is rarely built under the influence of sudden and radical changes; instead, it is a long-term impact of social, political and economic developments (Isakjee, 2017; Balestra and Tonkin, 2018). For this reason, many countries have consistent results in terms of the typology of the regime assigned to them. Such countries include, for example, Sweden, Australia, New Zealand, the United Kingdom, Germany, Portugal, Greece, Italy and Spain (Isakjee, 2017). According to Sharkh and Gough (2010), only a small number of different social regimes can be identified in the world. The authors have shown that membership in the same groupings leads to overlapping regimes between countries. The main reason is the effort to deal with redistributive policies within the community, also based on economic differences among member states.

At present, there is no single study available for all EU countries to answer whether social regimes change within a given country over time. The present paper aims to monitor changes in the social regimes of EU countries over time in the context of the economic situation of these countries.

2. Literature Review

Based on the nature of the redistribution policy in individual EU countries, groups of countries with similar characteristics have been defined in the past. According to Esping-Andersen (1990), three country models were defined. The first was the social-democratic model characterized by a universal egalitarian social policy, a high degree of decommodification, a low level of stratification of society and a limited volume of social services provided by the private sector. This includes countries such as Sweden, Denmark and Finland. The second, conservative model, was characterized by excellent protection of the family and employment. The social system of conservative states supports the maintenance of the status quo and existing inequalities. The level of decommodification is medium. However, social policy is significantly stratified according to gender, social class, status and occupation. The primary social insurance provider is the state, private insurance has only a marginal role. According to Esping-Andersen (1990), Germany, France, Austria, Belgium, Italy and the Netherlands were included in this group. The third was a liberal model characterized by a low level of decommodification, a high stratification of society, a limited role of the state and a significant share of the private sector in the provision of social services and insurance. As the liberal regime is characterized by a preference for a market system and social policy is only a correction of market failures, social

protection is minimal in this model. The United Kingdom and Ireland were included in this group.

This study was immediately criticised despite the simplicity and subsequent widespread use of Esping-Andersen's typology in the literature. It was aimed at a limited number of countries, their incorrect allocation, the revaluation of cash social benefits and the absence of gender implications. Its typology was therefore later supplemented by other authors with other social regimes.

There are currently several studies available analysing the social regimes of selected EU countries. Based on them, Table 1 was developed.

Ferrera (1996) distinguishes the southern model, characterized by high fragmentation and polarization of the social system, generous old-age pensions, gaps in the social safety net, clientelism in the distribution of cash income and a highly collusive system of public and private institutions in the social sphere (Italy, Spain, Greece, Portugal, Cyprus and Malta).

Gough (2001) examined social regimes in Europe by cluster analysis. He distinguished eight social assistance schemes, which stemmed from his judgements regarding the three dimensions of social assistance systems in each country: their scope, programme structure and generosity. He used macro data as total government expenditure on GDP, recipients of social assistance as a share of the total population, the Exclusion Index, a standardized level of benefits after housing costs and a variable of the relative level of benefits after housing costs. The results of his cluster analysis are summarized in Table 1.

Arts and Gelissen (2002) analysed several studies in social regimes. Among the best-known studies were Leibfried (1992), Siaroff (1994), Ragin (1994), Kangas (1994), Shalev (1996), Bonoli (1997), Korpi and Palme (1998), Obinger and Wagschal (1998), Wildeboer Schut *et al.* (2001). Authors conclude that actual welfare states are seldom a pure type, and they usually apply hybrid regimes. They agree with the results of Goodin *et al.* (1999), who say that welfare states have the intended results and generate unintended consequences. The social-democratic regime is best placed to realize its core value, *i.e.*, minimizing inequality. It is equally good at reducing poverty, which is a priority of the liberal welfare state regime, and at promoting stability and social integration, which is the starting point of the corporatist welfare state regime.

Ferreira and Figueiredo (2005) conducted a multi-level cluster analysis in the countries of the European Union before and after the enlargement of May 2004 (EU 15 and EU 25) following a comprehensive approach that considers different dimensions of welfare using an extended set of variables. The analysis results show that EU membership gradually blurs the strict boundaries between clusters and mixes countries. The Mediterranean countries still make a distinct cluster, and by combining new and old member states, a new

cluster is made. The authors assume that governments will approach economic results and apply a common social policy.

Table 1: Overview of results of studies focused on social regimes of EU countries

Author	Model/regime	Countries
Esping-Andersen (1990)	Social democratic model	SE, DK, FI
	Conservative model	DE, FR, AT, BE, IT, NL
	Liberal model	UK, IE
Ferrera (1996)	Southern model	IT, ES, EL, PT, CY, MT
Gough (2001) 8 welfare regimes (only European countries)	Welfare states with integrated safety nets	UK, IE
	Decentralized discretionary relief	AT, NO, CH
	Dual social assistance	BE, FR, DE, LU
	Rudimentary assistance	IT, ES, EL, PT
	Citizenship-based but residual assistance	DK, FI, NL, SE
Fenger (2007)	Post-communist European model (mix of conservative and social-democratic models)	BG, HR, CZ, HU, PL, SK, SI
	Model of the former USSR	EE, LV, LT
Bohle and Greskovits (2007)	Neoliberal model	EE, LV, LT
	Embodied neoliberal model	SK, CZ, PL, HU
	Neo-corporate model	SI
Kammer <i>et al.</i>, (2012)	Social democratic model regime	DK, FI, SE
	Hybrid model regime	BE, NL
	Conservative model regime	AT, DE, FR, LU
	Southern model	EL, PT, IT, ES
	Liberal model	UK, IE

Note: Country codes come from European Commission.

Source: Own processing by the authors

Fenger (2007) distinguishes between the post-communist European model and the model of the former USSR. The European model represents a mix of the conservative and social-democratic models of Esping-Andersen (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovakia, Slovenia). The social model of the former USSR is characterized

by high women's participation, extensive public sector nature, high economic growth with high inflation (Belarus, Estonia, Lithuania, Latvia, Russia, Ukraine).

Bohle and Greskovits (2007) distinguish three social models in post-communist countries: the neoliberal model of the Baltic countries, the embodied neoliberal model of the Visegrad countries and the neo-corporate model of Slovenia. They are based on the nature of state institutions and the success of countries in implementing the principles of market economy, the nature of industrial transformation, social inclusion and macroeconomic stability.

Lendvai (2009) does not see welfare regimes as static and fixed entities; rather, they are fluid and changing, and the significance is that these regime types are not locked into one pathway but can and do both converge and diverge at the same time. In his study, he focuses on the social regimes of post-communist countries. There are also differences in this group of countries, and their economic and social development leads to them entering other social regimes. For some of them, such as Hungary and Poland, it is difficult to define a precise social regime.

Kammer *et al.* (2012) examined social regimes and welfare state outcomes in the EU 15 using microdata. The analysis is based on a wave of EU Statistics on Income and Living Conditions (SILC) from 2007. The sample ranges from 3,885 households in Luxembourg to 20,982 households in Italy. They used redistribution variables for cluster analysis. The result was the division of countries into social democratic regimes, including Denmark, Finland and Sweden; a hybrid model, which according to the authors, includes Belgium and the Netherlands; a conservative model, including Austria, Germany, France and Luxembourg; the southern model, comprising Greece, Portugal, Italy and Spain; and the liberal model with Ireland and the UK. In the end, he found that the conservative and southern models are relatively similar, mainly due to the similarity in the structure of welfare states. At the same time, the difference in the overall redistribution is quite significant.

According to Vašková (2013), the clustering of EU countries according to social models revealed different levels of income inequality for individual social regimes. Countries with a non-corporate and social-democratic regime have the lowest rates of income inequality. Conversely, the highest income inequalities are characteristic of countries with a liberal social model. The level of income inequality can also be related to state spending on social benefits. Social benefits as a % of GDP are the highest in the case of conservative and social democratic countries and those with a neo-corporate social model; they are the lowest in the case of countries with a neoliberal and liberal social model. The Gini index was also included among the examined variables. The result of the study is that Ireland, Finland, Slovenia, Belgium and the Czech Republic have

the most effective redistributive policies. The type of social model does not primarily determine the redistributive policy of the state, and the size of income inequality does not depend only on the country's affiliation to a certain social model.

3. Data and Method

For the needs of the analysis of social regimes, a group of redistributive and economic variables was selected. Redistributive variables were chosen with an emphasis on the tax system, social transfers, education and health indicators (Fenger, 2007; Peková, 2008; Sharkh and Gough, 2010; Kammer *et al.*, 2012; Lauden, 2015). The Gini index was added, which captures the level of income inequality (Claus, 2012). The group of socio-economic variables consists of basic macroeconomic indicators used to compare countries in this area.

To achieve the paper's primary goal, a hierarchical cluster analysis is used, which helps identify groups of countries belonging to a given social regime based on selected redistributive variables. Possible changes in the composition of clusters are monitored with two selected periods, namely 2007 and 2019. Hierarchical cluster analysis is one of the most frequently used methods of defining a country's social affiliation, which can be seen in its application in older (Esping-Andersen, 1990; Kangas, 1994; Obinger and Wagshchal, 1998; Pitruzello, 1999; Gough, 2001; Saint-Arnaud and Bernard, 2003; Fenger, 2007) as well as more recent studies (Sharkh and Gough (2010; Kammer *et al.*, 2012; Bertin and Carradore, 2015; Mkandawire 2020). To refine the results of hierarchical cluster analysis, the authors use the *k*-means method, which should ensure a more precise definition of clusters (Powell and Barrientos, 2004; Ferreira and Figueiredo, 2005; Sharkh and Gough, 2010; Bertin and Carradore, 2015). In the case of the *k*-means clustering, it is necessary to define an optimal number of clusters. For that reason, we used the gap statistic (Tibshirani *et al.*, 2001), the silhouette method (Rousseeuw, 1987), and the elbow method (Ng, 2012).

All the EU countries, including the United Kingdom, were selected for the analysis. Two periods were chosen, namely 2007 and 2019. The year 2007 is the last pre-crisis year, when the data should represent the development of countries without distortion by the economic crisis of 2008. Likewise, 2019 is the pre-pandemic year. In the next period, the data are marked by changes in the economic and social areas. The data sources are Eurostat, OECD, the LIS database, The Global Economy, and the European Commission. A brief overview of the data is presented in Table 2.

Table 2: Description of redistributive and socioeconomic variables

Abbreviation	Unit	Redistribution variable
<i>Gini</i>	%	Gini index
<i>tax_rev</i>	% GDP	Tax revenues
<i>soc_exp</i>	% GDP	Social expenditure
<i>soc_contr</i>	% GDP	Social contributions
<i>t_corporate</i>	% GDP	Taxes on consumption
<i>t_goods</i>	% GDP	Taxes on labour
<i>t_income</i>	% GDP	Taxes on capital
<i>t_property</i>	% GDP	Property taxes
<i>health_exp</i>	% GDP	Total general government expenditure on health
<i>education_exp</i>	% GDP	Total general government expenditure on education
<i>risk_poverty</i>	%	At-risk-of-poverty rate by the poverty threshold
Abbreviation	Unit	Economic variable
<i>gdp_pps</i>	million pps	Gross domestic product (in purchasing power standards)
<i>infl</i>	%	HICP inflation
<i>unempl</i>	%	Unemployment rate
<i>def</i>	% GDP	Government deficit
<i>pop_density</i>	population/m ²	Population density
<i>fdi</i>	% GDP	Foreign direct investment
<i>odr</i>	%	Old-age dependency ratio
<i>remitt</i>	% GDP	Remittances
<i>sse</i>	% of all eligible children	Secondary school enrolment, per cent of all eligible children

Source: Own processing by the authors

For the needs of the cluster analysis, correlation coefficients between the input variables were calculated. Based on their results, variables such as trade balance, foreign direct investment, social globalization index and political globalization index, social benefits to households and population density were removed from the analysis.

Due to the different units of the input variables, the data were standardized by Equation 1.

$$\frac{x - \min(x)}{\max(x) - \min(x)}. \quad (1)$$

When analysing EU countries, the number of groups of countries is not a priori determined; therefore, a hierarchical cluster analysis is chosen, which in many cases creates less numerous but well-distinguishable clusters (Král', 2009). Subsequently, the average linkage method is applied, where the distance between two clusters A and B is determined as the average distance between all objects in these two clusters, which is expressed by Equation 2.

$$d(AB) = \frac{1}{n_A n_B} \sum_i \sum_j d_{ij}. \quad (2)$$

All clustering methods are based on determining the similarities of objects to be assigned to a shared cluster. According to the parallel, we can consider the objects of the cluster to be the same. A significant part of the similarity measures is based on the calculation of object distances, and these similarity measures are also the most used. We applied Euclidean distance.

The cluster analysis results are dendrograms and cartograms, based on which it is possible to define clusters of countries with similar types of redistribution policy.

4. Results

4.1 GDP and Gini coefficient in EU countries

Despite the EU's efforts to achieve economic and social equality, there are considerable differences among countries. These fail to disappear mainly between the old and new member states that joined the EU after 2004; see Table 3.

When ranking countries by GDP per capita in 2019, the lag of the new Member States behind the old ones is visible. The exceptions are Greece and Portugal, which have fallen into the group with the new member states due to the continuing bad economic and political situation. In the case of comparing countries using the Gini coefficient for 2019, the division of countries into old and new is not justified. The income inequality examined by the Gini coefficient is not typical of any group of countries. Countries with higher income inequality include Bulgaria and Romania, as well as the United Kingdom, Spain and Italy. On the other hand, the lowest income inequality was in Slovakia, Slovenia and the Czech Republic, but also in Finland and Belgium. Table 3 indicates that the redistributive policy pursued by the state is not necessarily related to the country's economic situation. However, this assumption needs to be addressed more comprehensively using hierarchical cluster analysis of redistributive and socioeconomic variables.

Table 3: Sorting of countries by GDP per capita and Gini coefficient for 2019

Countries sorted by GDP 2019 per capita					Countries sorted by Gini coefficient 2019				
Country	EU member	2007	2019	Change (%)	Country	EU member	2007 (%)	2019 (%)	Change (%)
BG	0	4,820	6,840	42	BG	0	35	40	5
RO	0	6,050	9,110	51	LT	0	34	35	2
HR	0	11,250	12,450	11	LV	0	35	35	0
LV	0	10,250	12,510	22	RO	0	38	35	-4
PL	0	8,550	13,020	52	UK	1	33	34	1
HU	0	10,390	13,270	28	ES	1	32	33	1
LT	0	9,770	14,010	43	IT	1	32	33	1
EE	0	13,270	15,760	19	LU	1	27	32	5
SK	0	11,960	15,860	33	PT	1	37	32	-5
EL	1	22,500	17,750	-21	CY	1	30	31	1
CZ	0	15,250	18,460	21	EL	1	34	31	-3
PT	1	17,230	18,630	8	EE	0	33	31	-3
SI	0	18,570	20,700	11	DE	1	30	30	-1
MT	0	15,470	21,990	42	HR	0	n.a.	29	n.a.
CY	1	24,420	24,530	0	FR	1	27	29	3
ES	1	24,380	25,200	3	PL	0	32	29	-4
IT	1	28,740	27,180	-5	IE	1	31	28	-3
UK	1	31,280	32,910	5	HU	0	26	28	2
FR	1	31,400	33,400	6	MT	0	26	28	2
BE	1	33,760	35,950	6	SE	1	23	28	4
DE	1	31,920	35,980	13	AT	1	26	28	1
FI	1	37,210	37,200	0	NL	1	28	28	0
AT	1	35,870	38,170	6	DK	1	25	27	2
NL	1	39,120	41,980	7	FI	1	26	27	0
SE	1	40,590	44,180	9	BE	1	26	25	-1
DK	1	46,210	49,270	7	CZ	0	25	24	-1
IE	1	41,240	60,130	46	SI	0	23	24	1
LU	1	84,420	83,640	-1	SK	0	25	23	-2

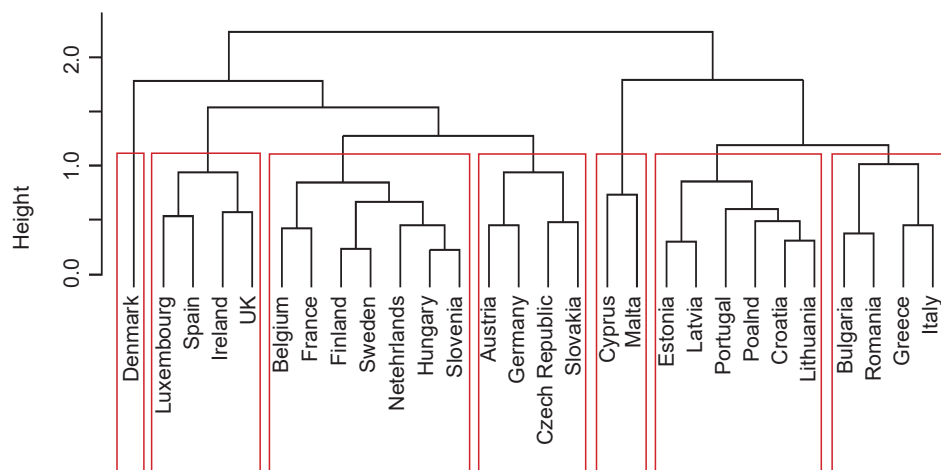
Note: EU member is 0 for a country that joined the EU after 2004, 1 for a country that joined the EU before 2004.

Source: Own processing by the authors based on Eurostat data

4.2 Results of hierarchical cluster analysis and *k*-means for 2007

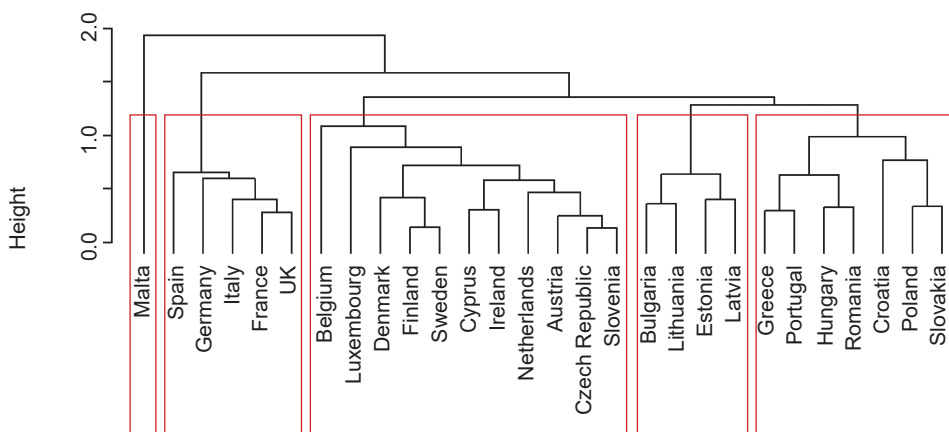
The results of the hierarchical cluster analysis for 2007 are depicted in Figure 1 and Figure 2. Figure 1 presents the results of the cluster analysis for the redistribution variables; Figure 2 is the dendrogram for the socio-economic variables.

Figure 1: Dendrogram based on redistributive variables for EU countries in 2007



Source: Own elaboration

Figure 2: Dendrogram based on socio-economic variables for EU countries in 2007



Source: Own elaboration

The cluster analysis of EU countries based on redistribution variables produced seven clusters in 2007 and five in 2019. Still, these can be combined into smaller sets according to the similarity of redistribution policies. Outside the crowds was Denmark, which was distinguished mainly by low social security contributions and high labour taxes. France and Belgium are very similar in terms of redistributive policy and represent a conservative hybrid model. Finland, Sweden and the Netherlands, which form one cluster with Belgium and France, can also be included in this regime. Hungary, Austria and Germany, representatives of the conservative regime, came together with Slovakia and the Czech Republic, representing a mix of conservative and social-democratic regimes. From the position of the three and four countries, we can discuss the overlap between the purely conservative and post-communist European models. By economic theory, countries such as Lithuania, Latvia and Estonia, which represent the neoliberal model or the model of the former USSR, also got into one cluster. Countries such as Croatia and Poland were in the same cluster with them. The placement of Ireland and the UK in a single group as representatives of the liberal regime was also confirmed. The countries of the southern model did not form identifiable clusters. The right-hand branch of the dendrogram shows that these countries are in clusters with post-communist states. This may indicate an overlap of social regimes. The exception is Spain, which is in a group with the countries of the liberal model.

On the other hand, large economic disparities between the old and new member states are still visible in 2007, as presented in Figure 2. Clusters based on socio-economic variables divide the EU into two groups. On the left, the cluster is represented by the old member states and on the right, by the group of new member states except Greece and Portugal.

The hierarchical cluster analysis for 2007 showed in some cases an overly significant overlap of regimes, which may confirm or refute the use of *k*-means analysis, the results of which are shown in Table 4. Centroids are presented in Appendix 1 and 3.

The results of *k*-means clustering in Table 4 show that regime overlap is present in the EU, but to a lesser extent than the results of the hierarchical cluster analysis indicated. The V4 countries and Slovenia no longer merge into one group of post-communist countries but find a new position among the countries with a conservative regime. Only Hungary and Slovenia are economically close to Western countries. We do not see the southern model as defined by theory. Italy and Spain are leaning towards countries with conservative regimes that are also economically close. In both redistributive and economic variables, Greece and Portugal got into the same cluster as Poland and Croatia.

Table 4: Clusters based on *k*-means clustering in 2007

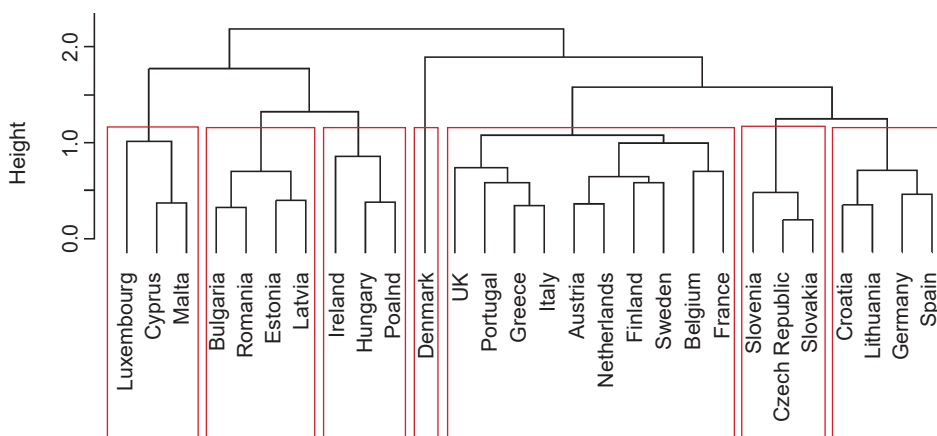
Redistribution variables		Economic variables	
Cluster	Countries	Cluster	Countries
1	Croatia, Poland, Greece, Portugal	1	Cyprus, Ireland, Luxembourg
2	Bulgaria, Estonia, Latvia, Lithuania, Romania	2	France, Germany, Italy, Spain, UK
3	France, Germany, UK, Italy, Spain	3	Czech Republic, Slovakia
4	Malta	4	Malta
5	Austria, Netherlands, Czech Republic, Hungary, Slovakia, Slovenia	5	Croatia, Greece, Poland, Portugal
6	Cyprus, Ireland, Luxembourg	6	Denmark
7	Belgium, Denmark, Finland, Sweden	7	Bulgaria, Estonia, Latvia, Lithuania, Romania
		8	Austria, Belgium, Finland, Hungary, Netherlands, Slovenia, Sweden

Source: Own elaboration

4.3 Results of hierarchical cluster analysis and *k*-means for 2019

Figures 3 and 4 present the results of the hierarchical cluster analysis in the second analysed period, which is 2019.

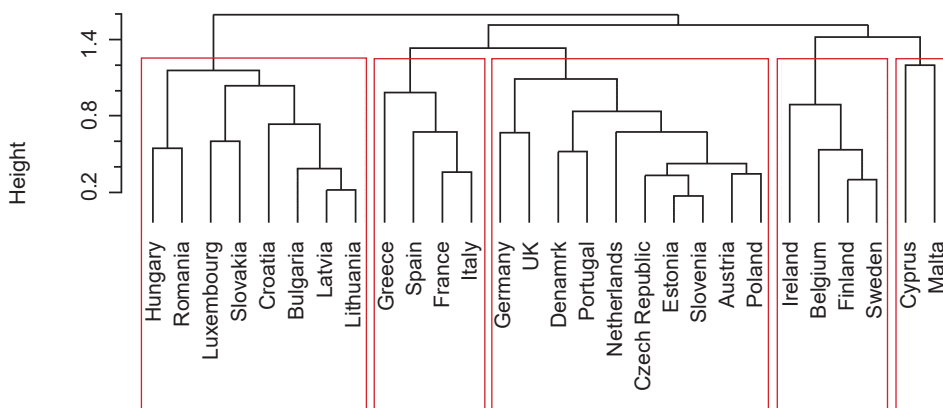
Figure 3: Dendrogram based on redistributive variables for EU countries in 2019



Source: Own elaboration

In the case of redistributive variables, some changes in cluster composition were noted. It is possible to see a mixture of countries, which according to theory, should belong to different social regimes, respectively. However, there are no strict boundaries that would divide the regimes into clusters. The first cluster consists of countries such as Luxembourg, Cyprus and Malta, combining the southern and conservative models. The second and third clusters are a combination of the post-communist model and the model of the former USSR. The exception is Ireland, which we classify as a country with a liberal model. The right-hand side of the cluster analysis combines the southern and conservative models. This can also be confirmed by Kammer *et al.* (2012). They argue that the conservative and southern models are relatively similar, mainly due to similarities in the welfare state structure, while the difference in overall redistribution is quite significant. A typical post-communist model is represented by Slovakia, Slovenia and the Czech Republic. Of the V4 countries, this cluster does not include Hungary and Poland, which Lendvai (2009) defined as countries for which it is difficult to determine the type of social regime. The results of the cluster analysis for 2019 show that there is an increased formation of mergers between countries with different social regimes. So we can talk about an overlap of regimes that is more pronounced than in 2007.

Figure 4: Dendrogram based on socio-economic variables for EU countries in 2019



Source: Own elaboration

The dendrogram compiled from socio-economic indicators for 2019 again points to persistent differences between old and new EU countries. The left-hand branch consists of post-communist countries such as Lithuania, Latvia, Bulgaria, Romania and Croatia, representing the same social regime.

The *k*-means analysis in 2019 also confirmed the overlap of regimes, but to a lesser extent than the hierarchical cluster analysis. The results of *k*-means for 2019 are shown in Table 5. Centroids are presented in Appendix 2 and 4.

Table 5: Clusters based on *k*-means clustering in 2019

Redistribution variables		Economic variables	
Cluster	Countries	Cluster	Countries
1	Bulgaria, Croatia, Estonia, Latvia, Lithuania, Hungary, Romania	1	Austria, Belgium, Denmark, Finland, Netherlands, Sweden, Czech Republic, Slovakia, Slovenia
2	France, Germany, Greece, Italy, Portugal, Spain, UK	2	Cyprus, Malta, Ireland, Luxembourg
3	Belgium, Denmark, Finland, Sweden	3	Bulgaria, Croatia, Estonia, Latvia, Lithuania, Hungary, Poland, Romania
4	Austria, Netherlands, Czech Republic, Poland, Slovakia, Slovenia	4	France, Germany, Greece, Italy, Portugal, Spain, UK
5	Cyprus, Ireland, Luxembourg, Malta		

Source: Own elaboration

Using *k*-means, a smaller number of clusters was identified, and their composition corresponds more to the existing theory of social regimes. Cluster 1 represents post-communist countries that are united by a similar economic situation in addition to the same neoliberal regime. The exception is Hungary, which should move towards a conservative regime like the other V4 countries, not the regime of the countries of the former USSR. The other V4 countries and Slovenia are also merging economically with conservative model countries such as Austria, Belgium, Denmark, etc. In 2019, it was already possible to identify a group of countries of the southern model, which are in cluster 2 and associate with the countries of the conservative model also in economic variables. Interesting is the liberal model, which is absent in the analysis. Ireland and the UK are in different clusters in both redistributive and economic variables.

4.4 Comparison of results with other studies

The hierarchical cluster analysis and the *k*-means pointed to changes in clusters of social regimes. The cluster analysis showed a strong overlap of the regimes, while the *k*-means yielded more compact results that can be compared with existing studies.

The results summarized in Table 6 point to the strong intersection of social regimes defined by theories, thus confirming the assumption that differences among social regimes are blurred over time. This is most pronounced between the post-communist and conservative models and the conservative and southern models. Interestingly, positions in the regimes change for the countries that joined the EU after 2004 and the founding countries of the EU. Only the social democratic model was stable, which, apart from Belgium, did not change its composition. The analysis has not confirmed the liberal model embraced by Ireland and UK as a separate regime.

Table 6: Social regimes of EU countries

Social regime	Other studies (Table 1)	Own results for 2019 based on <i>k</i> -means
Model of the former USSR	Estonia, Latvia, Lithuania	Cluster 1: Estonia, Latvia, Lithuania, Bulgaria, Croatia, Hungary, Romania
Post-communist European model	Slovakia, Czech Republic, Poland, Hungary, Slovenia, Bulgaria, Croatia	
Conservative model	France, Netherlands, Belgium, Austria, Germany, Luxembourg	Cluster 4: Austria, Netherlands, Czech Republic, Poland, Slovakia, Slovenia
Southern model	Cyprus, Malta, Spain, Italy, Greece, Portugal	Cluster 2: France, Germany, Greece, Italy, Portugal, Spain, UK Cluster 5: Cyprus, Ireland, Luxembourg, Malta
Social democratic model	Denmark, Finland, Sweden	Cluster 3: Belgium, Denmark, Finland, Sweden
Liberal model	Ireland, UK	

Source: Own elaboration

5. Discussion and Conclusion

The conclusions of the hierarchical cluster analysis confirmed the results of an extensive study by Arts and Gelissen (2002) that social regimes overlap among countries. In the present study, this statement was demonstrated for 2007 and 2019. New clusters are formed by combining the conservative and southern models and the conservative and post-communist models. In the context of the economic level of the countries, it was possible to identify persistent differences between the “old” and “new” member countries. However, the hierarchical cluster analysis showed insufficient accuracy in clustering for both redistributive and economic variables. This problem was solved by a *k*-means analysis, which clearly defined the groups of countries that made it possible

to compare social regimes over time and in the context of the economic situation of EU countries. The *k*-means analysis concludes that social regimes do overlap, and over time a country with one regime moves to a group of countries with a different regime. However, these are regimes of a similar nature. This is the case of the Czech Republic, Poland, Slovakia and Slovenia, which moved to the conservative model from the post-communist model. The trend of overlapping regimes has also affected the founding countries of the EU, with a large part of the southern model countries such as Italy, Portugal and Spain already in 2019 already part of a cluster with conservative model countries such as France and Germany. There was also a shift from the post-communist model to the model of the former USSR in the case of Hungary and Bulgaria. Countries such as Ireland and the UK, which in studies (Gough, 2001; Kammer *et al.*, 2012) act as a separate liberal regime, have been included in the cluster of countries with a combination of conservative and southern regimes.

The *k*-means analysis also showed important knowledge in the existence of the relationship between the social regime and the economic situation in the country. In both 2007 and 2019, almost all the EU countries showed that clusters with the same social regime also had the same economic situation, which the cluster analysis did not show at all. This means that the country's redistributive policy is closely linked to its economic situation, which is also visible in the Baltic countries together with Bulgaria and Romania, which, despite EU membership, still apply the original welfare model.

The paper showed a clear tendency in the EU for social regimes to overlap. However, it is also possible to identify significant differences in redistributive policies related to the persisting differences in the economic situation of the Member States. However, applying a different redistributive policy is of interest and needs to be respected. The Lisbon Strategy has set out steps to reduce the disparities in the redistribution of EU countries. Still, these must be implemented without drastic changes that could lead to social unrest.

Studies (Berg and Ostry, 2011; Easterly, 2007; Berg *et al.*, 2012; Bénabou, 2000, 2002; Bleaney *et al.*, 2001) show that a well-designed redistribution policy leads to sustainable economic growth. For this reason, it is important to address public expenditure, such as public investments in infrastructure, health, education and social security, which can be pro-growth and contribute to equality. It is equally important to address the EU's common redistributive policy challenges, such as the sustainability of pension systems, strengthening the middle class and tackling gender inequality.

Appendices

Appendix 1: Cluster centres, redistributive variables, k-means 2007

Variable	Cluster						
	1	2	3	4	5	6	7
<i>gini</i>	0.797	0.132	0.113	0.644	0.503	0.321	0.161
<i>tax_rev</i>	0.180	0.464	0.083	0.151	0.232	0.864	0.213
<i>soc_exp</i>	0.120	0.986	0.330	0.597	0.438	0.275	0.739
<i>social_contrib</i>	0.577	0.000	0.838	0.712	0.504	0.434	0.832
<i>t_corporate</i>	0.254	0.340	0.461	0.265	0.561	0.988	0.340
<i>t_goods</i>	0.696	0.145	0.617	0.329	0.373	0.849	0.124
<i>t_individual</i>	0.090	1.000	0.026	0.162	0.255	0.127	0.294
<i>t_property</i>	0.082	0.409	0.046	0.302	0.778	0.242	0.339
<i>health_exp</i>	0.322	1.000	0.755	0.683	0.623	0.284	0.767
<i>education_exp</i>	0.797	0.132	0.113	0.644	0.503	0.321	0.161
<i>risk_poverty</i>	0.180	0.464	0.083	0.151	0.232	0.864	0.213

Source: Own elaboration

Appendix 2: Cluster centres, redistributive variables, *k*-means 2019

Variable	Cluster				
	1	2	3	4	5
<i>gini</i>	0.122	0.240	0.510	0.556	0.396
<i>tax_rev</i>	0.387	0.633	0.398	0.369	0.521
<i>soc_exp</i>	0.458	0.840	0.623	0.279	0.243
<i>social_contrib</i>	0.912	0.636	0.690	0.705	0.459
<i>t_corporate</i>	0.391	0.398	0.288	0.156	0.816
<i>t_goods</i>	0.553	0.394	0.365	0.459	0.357
<i>t_individual</i>	0.164	0.534	0.271	0.087	0.193
<i>t_property</i>	0.138	0.555	0.577	0.133	0.314
<i>health_exp</i>	0.837	0.837	0.616	0.273	0.198
<i>education_exp</i>	0.468	0.779	0.303	0.447	0.408
<i>risk_poverty</i>	0.146	0.279	0.642	0.701	0.401

Source: Own elaboration

Appendix 3: Cluster centres, economic variables, *k*-means 2007

Variable	Cluster							
	1	2	3	4	5	6	7	8
<i>gdp_pps</i>	0.000	0.087	0.086	0.128	0.186	0.091	0.782	0.015
<i>infl</i>	0.000	0.410	0.202	0.117	0.133	0.181	0.166	0.626
<i>unempl</i>	0.217	0.473	0.159	0.457	0.402	0.797	0.451	0.174
<i>def</i>	0.390	0.199	0.588	0.576	0.892	0.393	0.398	0.683
<i>pop_density</i>	1.000	0.065	0.113	0.262	0.037	0.067	0.140	0.045
<i>fdi</i>	1.000	0.144	0.163	0.155	0.128	0.128	0.121	0.116
<i>odr</i>	0.286	0.614	0.329	0.694	0.605	0.342	0.791	0.589
<i>remitt</i>	0.757	0.150	0.123	0.486	0.060	0.696	0.066	0.717
<i>sse</i>	0.175	0.119	0.226	1.000	0.341	0.116	0.199	0.179

Source: Own elaboration

Appendix 4: Cluster centres, economic variables, k-means 2019

Variable	Cluster			
	1	2	3	4
<i>gdp_pps</i>	0.000	0.054	0.544	0.083
<i>infl</i>	0.000	0.519	0.188	0.168
<i>unempl</i>	0.217	0.437	0.522	0.217
<i>def</i>	0.390	0.459	0.378	0.716
<i>pop_density</i>	1.000	0.047	0.107	0.106
<i>fdi</i>	1.000	0.145	0.121	0.138
<i>odr</i>	0.286	0.504	0.754	0.442
<i>remitt</i>	0.757	0.589	0.069	0.202
<i>sse</i>	0.175	0.137	0.222	0.313

Source: Own elaboration

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