

Comparison of the European Union Member States in the Field of Social Insurance in the Period 2007–2019

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Abstract:

The article aims to compare the Member States of the European Union in the field of social insurance over the selected period. In this context, it is necessary to identify the trend of changes in the period 2007–2019. The article answers two questions. First, whether there is a growth in the share of social insurance in the tax systems or not. The second question concerns the approximation of the Member States in the field of social insurance. The Eurostat database is a source of indicators that represent social insurance in the tax system of the individual Member States of the European Union. We used Ward's method of cluster analysis to evaluate the annual results. Three indicators are subject to cluster analysis. The result of our work comprises four groups of the Member States of the European Union. Each group consists of similar states. Our results confirm that the country's historical position and traditions influence the established social insurance system. The European Union law ensures social security coordination. It mainly affects migrants.

Keywords: Social Insurance; Tax System; European Union.

JEL classification: H22; H24.

1 Introduction

Social insurance contributions developed in Western Europe mainly after the Second World War. As a result, the volume of public budgets grew significantly. This public budget-sourced income is then used to pay old-age and disability pensions, maternity, unemployment and sickness benefits, compensations for accidents at work, and other payments of financial assistance.

Pension system reforms have taken place in many countries of the European Union (EU). The reason was to streamline social systems and improve legal regulations. Countries that have undergone reforms have either tightened the pay-as-you-go way of financing social security or switched to the funded way of financing. A system of notional defined contributions (NCDs) is in place in the countries with these

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largest reforms. The insured's contributions to the insurance system and the demographic situation define the amount of social contributions (Schneider, 2011).

Social insurance contributions are one of the youngest taxes. Germany first introduced them for civil servants in 1880. These contributions do not exactly meet the conditions for inclusion in the category of taxes, but due to some characteristics, they are very close to taxes. The main similarity lies in the obligation and regularity of the payment of contributions. The amount of a citizen's income determines the amount of the social security contribution. Consequently, the value of the insurance indemnity does not depend on the amount of the contribution paid (Kubátová, 2018).

Peters (1991) examined the shares of all types of taxes in relation to total tax revenues in selected countries of the world in 1965. In his publication, the author states the year of the introduction of social security systems in the monitored countries. Chancellor Otto von Bismarck (1815–1898) introduced the concept of social security in Germany. Prior to the introduction of this concept, various voluntary collections and church initiatives helped the poor in Europe. Leyer (2011) wrote about the history of social security in his thesis in more detail. Prime Minister Eduard Taaffe (1833–1895) was responsible for social reform in Austria-Hungary. Bismarck was his role model. The first laws in the field of sickness and accident insurance came into force in 1888.

For example, based on Peters (1991) the following states have introduced social security: Germany (1883), Austria (1887), Norway (1894), Italy (1898), France (1910), Great Britain (1911), Denmark (1916), and USA (1935). This author writes about changes in the average share of social security in the tax mix. On average, social insurance accounted for only 4% at the beginning of the 20th century. This share was 6% in the 11 countries surveyed in 1929 and increased to 14% in 1952. The expansion of programs for other groups of employees, the growth in the number of programs, and the increase in benefits from them is the reason for the increase in the share of social security in total tax revenues. Income taxes and social security contributions together formed the dominant part of government revenue in the period under review. Their common political disadvantage is that the taxpayer sees them directly and clearly. They do not hide *e.g.* in prices, which is what the value-added tax does. Governments are therefore seeking additional sources for the rising costs of providing public and social services, including indirect mechanisms.

However, the social security system is an important revenue and expenditure component of public budgets today. The state can implement social policy through this system. The income component is the collected social security premiums. The state finances subsidies, benefits and other social assistance mainly from social security contributions. The country is trying to achieve social stability and prevent

social events or mitigate their consequences through this state support. Changes in the development of social contributions position we can expect in the future in connection with population ageing. Older migrants are joining Europe's ageing population. They may come for higher well-being in old age or for other reasons.

Klazar (2011) emphasizes that social security systems are an important component of both revenue and expenditure. Through this social security, the state implements its policy in the field of health care for citizens in old age, sickness and unemployment.

Kaczor (2015) considers the protection of citizens against the effects of unexpected adverse social events to be the main function of social insurance. However, many secondary functions must work to fulfil this function. The redistributive function is necessary to obtain funds. The task of the homogenization function is to shift resources from the rich to the poor. The stimulus function encourages citizens to desired behaviour, and thanks to the preventive function, the state strives to provide everyone with dignified living conditions.

Tröster *et al.* (2010) state that social insurance is a compulsory financial system. This institute is wide-spread, as it forces citizens to take care of themselves and their relatives in the future through deferred personal consumption. We can divide the social insurance subsystem into a pension insurance system and a health insurance system.

2 Literature Review

The social security systems of the Member States are coordinated within the European Union by Regulation (EC) No 883/2004 on the coordination of social security. Coordination works on four main principles:

1. The principle of equal treatment for nationals and migrants in the territory of the Member States.
2. The principle of application of the legal order of a single state – the rules of the state where the person works apply.
3. The principle of aggregation of periods of insurance for entitlement to a social security benefit in one of the participating States.
4. The principle of preserving acquired rights – payment of social insurance benefits even outside the state where the person acquired these rights.

The aim of this article is to analyse social security in the 28 Member States of the European Union and to create groups of countries with similar social security features in their tax systems. Although the United Kingdom is one of the Member States originally surveyed, it has since left the European Union (in early 2020). We

analysed social security in the Member States of the European Union, including the United Kingdom, during the period 2007–2019.

European Union Member States have different approaches to social security (European Commission, 2020). The history and traditions determine the Member States' approach to social security. Although each country has social security legislation and legislation within its jurisdiction, all such legislation must be subject to the EU rules. The reason is to maintain citizens' entitlement to social security when travelling freely between the Member States. The European System of Integrated Social Protection Statistics (ESSPROS) is an important organisation focused on social protection in the countries of the European Union. The EU Statistical Office (Eurostat) established this institute at the end of 1970. It focuses on the comparison of social benefits and the method of financing benefits in individual EU countries.

A working paper by Eurostat (2021b) systematically compares the methodology of social protection statistics with the national accounts methodology in order to describe how social protection statistics relate to the national accounts on various conceptual dimensions. The general definitions of ESSPROS social benefits and social contributions result from national accounts and accounting policies are generally the same. However, in national accounts, social benefits and contributions are part of a more general system and certain accounting options – such as redirecting employers' social contributions – can be a source of disparities. The overlap of different types of premiums or the range of social benefits can make a difference.

Kuszykiewicz-Fedurek (2020) recorded the European Union regulations and their amendments since 1958. Regulations No 3/1958 and No 4/1958 on social security for migrant workers entered into force in 1959. Modifications to these regulations concerned the extension of the personal domain or regulations. The other two new regulations came into force in 1971. These are Regulation (EEC) 1408/71 on the application of social security schemes to employed persons, to self-employed persons, and to the members of their families moving within the Community, and Regulation (EEC) No 574/72 laying down the procedure for implementing Regulation No 1408-1471. The accession of new countries to the European Union caused further changes. New rules to improve cooperation between social security institutions have come into force. These are Regulation (EC) No 883/2004 and Implementing Regulation (EC) No 987/2009 of the European Parliament and of the Council. Another Regulation (EC) No 988/2009 of the European Parliament and of the Council of 16 September 2009 amended the previous Regulation (EC) No 883/2004 and strengthened the obligation for other institutions to cooperate for the benefit of citizens. A further amendment to the original Regulations of 2004 and 2009 (*i.e.* Regulation (EC) No 883/2004 and Regulation (EC) No 987/2009 of the

European Parliament and of the Council) was introduced by Commission Regulation (EU) No 1244/2010 of 9 December 2010. Other regulations in this area entered into force in 2012. These are Regulation (EU) No 465/2012 of the European Parliament and of the Council and Commission Regulation (EU) No 1224/2012 of 18 December 2012.

Młynarczyk (2014) deals with the coordination of social security in the European Union. She mentions in detail the principles that were already state above and draws attention to the fact that the European Union regulations in the field of social security establish rights and obligations for all the persons moving between the Member States of the European Union. The aim of this right is not to harmonise national social security systems, but to protect citizens from losing their social security rights to the extent that the European Union regulation does not invalidate national law. It is for the national legislature to determine, *inter alia*, who is the subject to compulsory social security, what scope of benefits the insurance covers, in what amount and under what conditions the social security premium is to be paid. Social security contributions are an important element of the EU's social security coordination system, as they are the primary responsibility of the insured. Social security institutions work together more effectively through coordination.

Brîndusa (2019) deals with the institutional provision of social security coordination between the Member States of the European Union. For a responsible accomplishment of the coordination of social security systems, a complex institutional administrative system consists at the EU level of the Commission, the Technical Data Processing Commission, the Audit Committee, and the Advisory Committee for the Coordination of Social Security Systems operate in the field of social security. In accordance with the principle of good administration, institutions are obliged to respond to all requests from persons within a reasonable time. Likewise, the persons concerned are obliged to inform the institutions of the Member State concerned and of the Member State of residence of any change in their personal or family situation. This applies if this situation violates the rights to various benefits provided by law. Failure to provide information shall be subject to appropriate penalties by the competent institutions under national law. The measures must be equivalent to those applied in similar situations so that applicants do not find it impossible or difficult to exercise the rights conferred by European law. If there are difficulties in interpreting or applying European law, the competent institutions of the Member States or of the Member State of residence of the person concerned shall contact the institutions of the Member States to be involved within a reasonable time. The Administrative Commission must find a solution where the national institutions have not found a solution. Administrative Commission establishes the practical ways to send information, documents or decisions by electronic means to the person concerned. If a social security institution declares

that it accepts electronic documents, it is obliged to accept the electronic document of the institution in another Member State. The author states that one of the principles underlying the coordination of social security systems is the “principle of good administration”, which concerns the obligation of the institutions of the Member States to cooperate with the other institutions and to provide mutual assistance for the benefit of the citizens. The legal provisions in force provide for enhanced cooperation in the provision of information to citizens. Institutions need to alert citizens to problem-solving, error correction and prompt information.

Kaczor (2015) presents the following principles of social policy:

- The principle of social justice – it is rather difficult to distinguish what is fair. The understanding of justice depends on the maturity of the given state. States follow three main approaches. The first approach means equal access for all. The second approach means a different approach based on merit. The third approach means a different approach according to needs. The principle of social solidarity – redistributing resources from the economically active to the socially needy. The state redistributes money by collecting taxes, social and health insurance, and paying out funds to the socially needy. The most common types of redistribution are the solidarity of the poor with the rich, the young with the old, the healthy with the sick, and the solidarity of the economically active with the unemployed.
- Subsidiarity principle – according to this principle, people in difficult life situations should first rely on themselves or their family and only then call on the state for help and solidarity.
- The principle of participation – important for the proper operation of the social system so that most citizens identify with it and understand it. It is therefore necessary that the citizen is not only a passive recipient of the social system but that s/he participates in its form and development.

The Government of the Czech Republic (2016) divides the social systems of the European States into five types in the document OSTEU (Department of Strategy and Trends of the European Union) Żukowski (2009) reports similar results.

- The Scandinavian model can also be labelled as socially democratic, because the state is increasingly involved in the social domain. A high degree of solidarity between rich and poor is a hallmark. Almost every citizen pays contributions to the system, thanks to which the state provides him or her with protection and a high level of social security. This group includes Denmark, Finland, Iceland, the Netherlands, Norway, and Sweden.
- The Island or Anglo-Saxon model is a supporter of liberal social policy and is of the opinion that the state should hardly interfere with the social system. In this model, states are of the opinion that they cannot deny individuals their rights, but

everyone has their responsibilities at the same time (everyone must take care of their own existence and their children). Citizens receive social benefits in the minimum amount (same for all) and their amount does not depend on previous income. This group includes Ireland and the United Kingdom.

- The Southern European (or Mediterranean) type of social systems is characterised by minimum social security for persons with below-average income and different ways of financing benefits (amount of benefit derived from contributions to the system) and health care (financed from taxes). This group includes Italy, Croatia, Portugal, Greece, and Spain.
- The continental model works on the principle that the amount of social benefits should correspond to the previous amount of income. This group includes Belgium, France, Luxembourg, Germany, Austria, Slovenia, and Switzerland.
- The Central Eastern European model includes post-communist countries. Żukowski (2009) states that post-communist countries are more united by their past. This group includes Bulgaria, Czechia, Estonia, Lithuania, Latvia, Hungary, Poland, Romania, and Slovakia.

Supreme Audit Office of the Czech Republic (2019) ranks Czechia among the countries with higher levies within the European Union. This applies to both social and health insurance. The high share of these contributions ranks the Czech Republic among the countries with a high tax burden on labour.

Common features of the EU countries in the field of social insurance

Ondrová (2013) lists two main common features. The first common feature of all the European Union countries is the use of premiums and, to varying degrees, other taxes to finance the social security system. Each state has established and collects social security premiums, although some countries in very small amounts. The second common feature is the insured's responsibility for paying contributions. In the case of employees, they share together with employers the responsibility for paying social security contributions in almost all countries.

Schneider (2011) deals with reforms to the pension systems. Many European Union countries have reformed their pension systems. The reason was to make social systems more efficient and to improve legal regulations. The countries that have undergone reforms have either tightened the pay-as-you-go way of financing social security or switched to a funded way of financing. Poland, Italy, Latvia, Sweden and Germany have implemented the largest reforms of pension systems. These countries have introduced a system of imaginary contributions system (NDC). In this system, the future income of an individual depends on contributions to the system and on the demographic situation of the country.

Main differences between the Member States

On the other hand, one of the fundamental differences in the individual social security systems is the different amount of contributions, the method, and the organisation of institutions that collect premiums.

Ondrová (2013) states that the amount of social security contributions is one of the visible characteristics of individual social systems. This should indicate the amounts of funds in the social system for redistribution. As mentioned above, contributions are not the only form of social security financing. Therefore, the informative value of the indicator is not too high. A more important characteristic is the indicator of the degree of workload. The employer pays a large amount of insurance premiums. Most countries of the European Union are among the countries with a high workload.

The same author also evaluates the institutional arrangements for premium collection and social insurance administration. This is another different feature of the Member States. Logically, the tax administration ensures the choice of social security if social security receives funding only from taxes. There are two ways to choose social security in cases where social security receives money from a combination of taxes and social security: (i) integrated tax administration; and (ii) the parallel tax and social administration (the tax administration and the social security administration).

Verbeke (2012) states that the extent of the income burden associated with social security contributions is significant and the most visible characteristic of individual systems. The extent of the burden of income levies does not always have a good explanation. The point is that social security is not the only source of funding and, as noted before, it is more or less linked to the taxes in every system. In some countries, social security contributions are very low, but there is also a high-income tax. It is therefore better to assess the overall labour burden, which may be one of the highest compared to, for example, the burden of consumption taxes, even though social security rates themselves are relatively low.

Foltysová (2007) and Bušovská (2014) dealt with the evaluation of the tax systems of selected countries. They assessed social insurance within these tax systems. Foltysová (2007) examined changes in tax mixes in OECD countries in the period 1965–2003. The shares of social insurance premiums in the total tax revenues of OECD countries were part of the examined data. It is evident that social insurance gained an increasing share of total tax revenues in the period under review. The share was 18% in 1965 and 26% in 2003. Social insurance received the highest share of total tax revenues in 2003. The author justifies the growth of the share of social insurance by high unemployment, an ageing population, and high health care expenditures. The author states that the Bismarck model persists in Europe,

regardless of whether the social security systems are financed outside the state budget through special state budget funds or directly through state budget chapters. She also mentions reforms in the financing of social security systems in OECD countries:

- Adjustment of social systems – increasing the retirement age, increasing the number of years for calculating benefits.
- National reserve pension funds – the state contributes to the fund from budget surpluses.
- An individual account – citizens contribute to the account during their working life. The state, employer, or third party can manage this account.

Bušovská (2014) dealt with the convergence of the tax systems of the Member States of the European Union. The author used beta and sigma convergence to analyse the data. Social insurance was also part of the analysed data. Social security revenues are converging the slowest in the EU Member States. The reason is the lack of harmonization and the efforts of states to bring these systems closer to the neighbouring states. The social system of each state is the result of historical development, political negotiations, and the needs of the population. It is a relatively complex system of legislation. Harmonization would not necessarily be a benefit. The Member States tolerate coordination criteria (see Section 1). As the author demonstrates, the result is the slowest convergence of social insurance of all the taxes examined.

Tepperová (2019) examined problems surrounding the interaction between personal income tax and social security contributions on a national and international level based on a case study of cross-border employment between Czechia and Denmark. The Czech and the Danish systems are very different, the case study allows for a clear illustration of the issue at hand. The Member States deal with social security legislation very differently. The author considers social security coordination in the EU Member States to be more appropriate than a uniform measure for all the Member States. Tepperová (2019) shows the differences between the Member States in terms of income tax and social security rates. Denmark approaches social security quite differently from the Czech Republic. Employees in Denmark pay a high personal income tax and low social security contributions. In Czechia, it is the opposite. Residents of Denmark must join the social security system there, and it can be considered one of the most generous in the EU with a high level of monetary generosity. On the other hand, the social security system of Czechia bears the signs of a post-communist economy and is more contribution-based. Demographic forecasts call both systems into question, as they are generally risky for all the systems. Double taxation treaties or Regulation No 883/2004 cannot completely overcome the differences between the two systems. These can both deepen the mismatches or reduce them, depending on the specific situation of the person and

the level of income. The author states that we should keep this in mind when discussing possible harmonization of coordination rules.

Dwyer and Papadimitriou (2006) point out the social security shortcomings of older migrants. Europe is now home to a significant and diverse population of older international migrants. Despite increased interest in the financial well-being of older people, many retired foreign migrants who legally reside in the European Union face structural disadvantages. Four linked factors are of particular importance in shaping the pension rights and levels of financial provision available to individual older migrants:

- Migration history.
- Socio-legal status.
- Past relationship to the paid labour market.
- Location within a particular EU Member State.

The population of older migrant residents within the EU is significant both in terms of its size and diversity. The authors identified a group of migrants who have social rights and refer to them as the EULM (the European Union International Labour Migrants). This is a privileged group relative to other migrants which is offered tangible benefits and treated as citizens who grow old in host EU states. The existence of such rights serves to counter assertions that EU citizenship is largely a symbolic rather than a substantial status (*cf.* Kleinman, 2001; or Weiler, 1998).

Goudswaard and Caminada (2015) focused on social security in 34 OECD countries. In the chapter of the article entitled “Descriptives”, the authors show that social security is of the utmost importance in the Member States of the European Union, but also in Japan. They used indicators of the share of social security in GDP and the share of social security in total tax revenues in the period 1980–2013. In most countries, contribution rates for employers are (much) higher than for insured persons – respectively, 64% and 36% of total social security contribution on average – although there are some exceptions (Chile, Luxembourg, the Netherlands, Poland and Slovenia). Contributions to the elderly, disability and survivor programmes are by far the largest in all countries. These contributions account for two-thirds of total contributions by insured persons and employers on average. Most countries also have contributions to unemployment and sickness programmes. In a minority of countries, citizens pay separate contributions to accidents at work and family benefits. Social security contributions are compulsory and have a tax-like nature. Their compulsory nature introduces the possibility of ex-ante redistribution into the arrangement. This is usually the case for national social insurance schemes, like public pension schemes with income-related contributions and flat-rate benefits.

3 Data and Methodology

The OECD classification puts social insurance into the group with the identification code 2000 – social insurance contributions. The OECD classification divides this group into smaller groups: 2100 Employees, 2200 Employers, 2300 Self-employed or unemployed, and Not classifiable to 2100, 2200 and 2300.

This article aims to determine the similarity of the EU Member States in the field of social insurance in the period 2007–2019. Cluster analysis divided countries with similar values of the selected indicators into groups. The number of groups is four or five. We used the clustering process for data from the Eurostat database in 2007, 2009, 2016 and 2019.

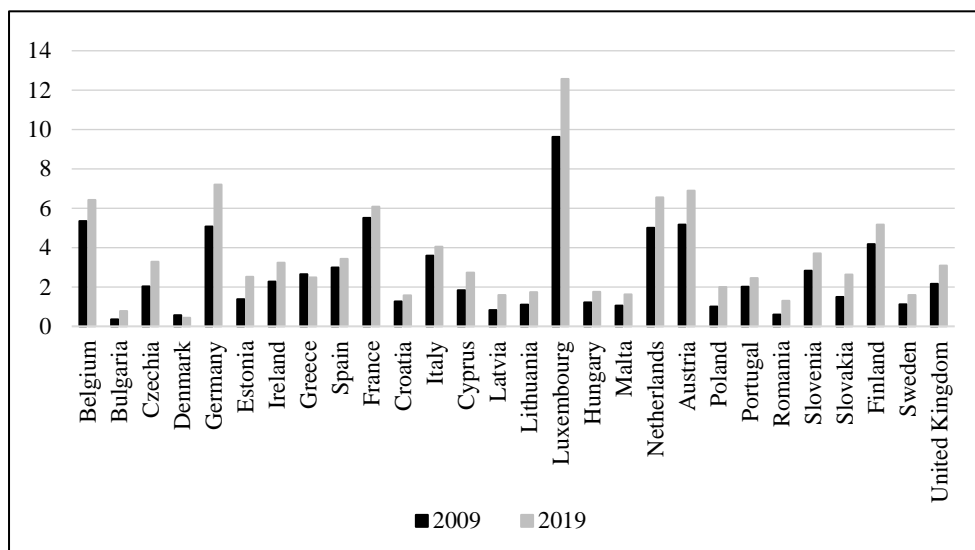
We obtained data on individual EU countries and their social insurance from the database of the European Statistical Office Eurostat. Ward's method of cluster analysis made it possible to compare social security in the Member States of the European Union. We chose this method because of the clear clustering. In addition, it forms relatively identical clusters.

We chose to compare quantitative macroeconomic units. Data from 27 Member States are subject to cluster analysis in 2007 and data from 28 Member States are subject to this analysis in other years. We selected three social security indicators for the cluster analysis. The first indicator participated in the clustering processes in 2007 and 2016. The indicator represents the annual social security contributions per capita. We used the indicator net social contributions in the years 2009 and 2019. Net social contributions (ESA 2010 code D.61) are the actual or imputed contributions made by households to social insurance schemes to make provision for social benefits to be paid.

We have selected the following ratios, which show the importance of social security in the tax systems of the Member States, for clustering processes:

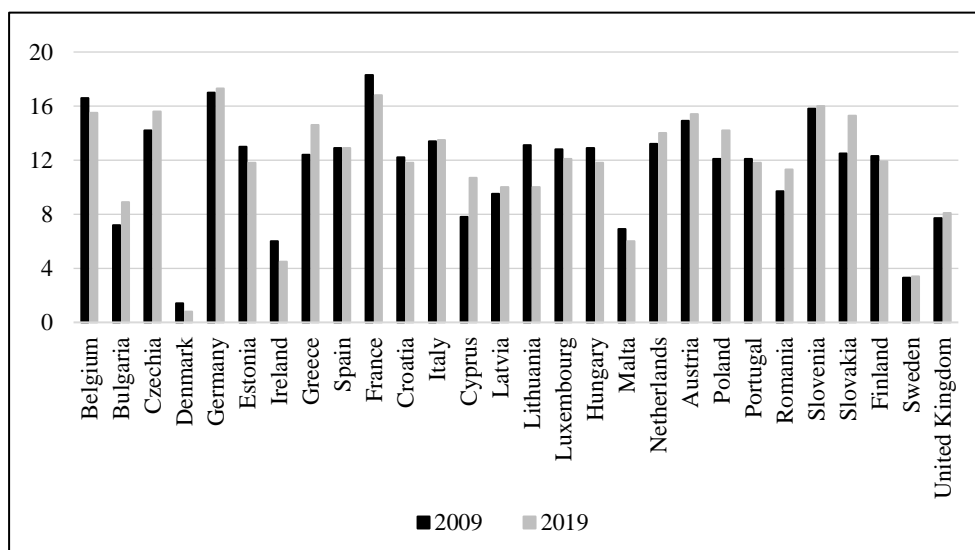
- Social contributions stated in thousand EUR per capita – the indicator of net social contributions per capita participated in the clustering processes in 2009 and 2019. In the years 2007 and 2016, the social security contributions indicator was used (Pániková, 2019). Fig. 1 shows a comparison of the amount of net social contributions per capita between the years 2009 and 2019.
- The percentage of net social insurance contributions in relation to a country's gross domestic product. Fig. 2 shows a comparison of the value of this indicator between the years 2009 and 2019.
- The share of net income from social insurance of total tax revenues. Fig. 3 shows a comparison of the value of this indicator between the years 2009 and 2019.

Fig. 1 Net social contribution in the year 2009 and 2019 (in EUR thousand per capita)

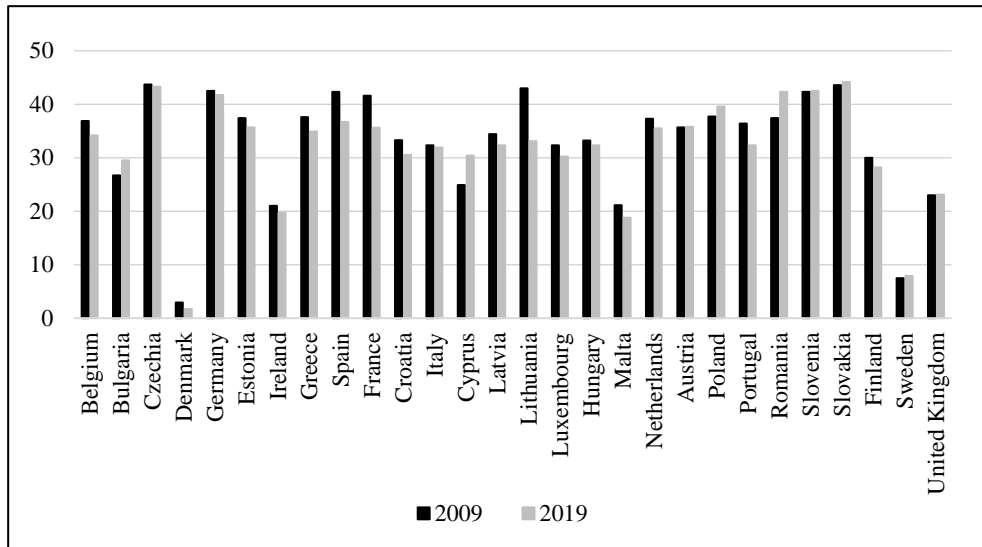


Source: Eurostat, 2021a.

Fig. 2 Net social contributions in relation to GDP (in %)



Source: Eurostat, 2021a.

Fig. 3 Net social contributions of total tax revenues (in %)

Source: Eurostat, 2021a.

We assume that the Member States approach social insurance differently and that this approach gets often influenced by the individual country's historical status and traditions. Although each country has social insurance legislation in its jurisdiction, all such legislation must be subject to the EU rules. The reason is that people can travel freely and not lose their social security entitlement.

Ward's method of cluster analysis evaluated groups of countries with similar social insurance representation in their tax systems. We standardised the data using Statistica 12 software. The cluster analysis compares selected indicators related to social insurance in individual countries in the years 2007, 2009, 2016 and 2019. The tables below the figures in the following text show the average values of the monitored indicators in these groups (clusters). These values are in a non-standardized form. We focused the greatest attention on net social insurance when evaluating the average. Of course, social insurance data and other selected values in the numerator of the fraction affect the level of the ratio

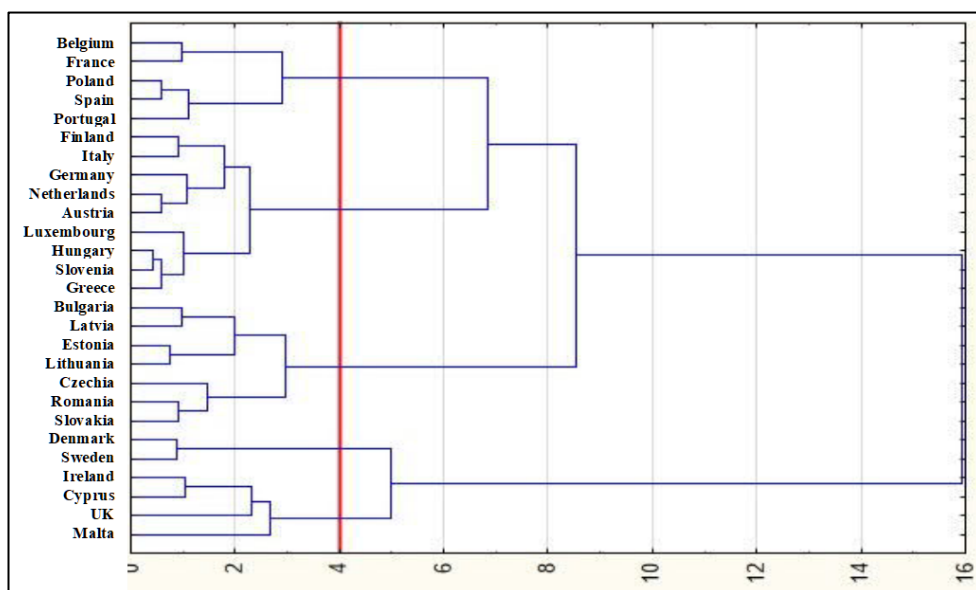
We expect social insurance to be rather stable in the period 2007–2019. Socially stable countries have a positive effect on people's willingness to work and increase their consumption, which can contribute to economic growth. On the other hand, some experts point to the problems caused by high social security contributions. This is similar to too high taxes. Both can also hinder economic growth or support the grey economy and the like.

4 Results and Discussion

Cluster analysis in the year 2007

We analysed data from twenty-seven European Union Member States without Croatia to the clustering process in this year 2007. The clustering diagram is shown in Fig. 4. Croatia was not included because of the absence of most of the necessary data in the Eurostat databases.

Fig. 4 Cluster analysis in the year 2007



Source: Eurostat, 2021a + authorial computation.

We divided the EU countries into five clusters at a distance of four points. Páníková (2019) has already presented these results in her thesis. We used them to supplement our results. Tab. 1 shows the average values of the monitored indicators in these clusters. Páníková (2019) grouped the countries into five groups:

- Cluster 1/2007: Belgium, France, Poland, Spain, and Portugal.
- Cluster 2/2007: Finland, Italy, Germany, Netherlands, Austria, Luxembourg, Hungary, Slovenia, and Greece.
- Cluster 3/2007: Bulgaria, Latvia, Estonia, Lithuania, Czechia, Romania, and Slovakia.
- Cluster 4/2007: Denmark and Sweden.
- Cluster 5/2007: Ireland, Cyprus, United Kingdom, and Malta.

Tab. 1 Average values of individual clusters in the year 2007

Cluster	EU country	Social contributions (EUR thousand per capita)	Percentage of net social security contributions in relation to a country's GDP (%)	Share of net income from social insurance in total tax revenues (%)
1/2007	Avg. of cluster	10.2	13.9	36.9
2/2007	Avg. of cluster	2.1	13.2	34.9
3/2007	Avg. of cluster	4.5	10.4	33.9
4/2007	Avg. of cluster	13.1	2.3	5.0
5/2007	Avg. of cluster	10.3	6.7	19.8
Avg. of all states	All 27 Member States	8.0	9.3	26.1

Source: Eurostat, 2021a.

Citizens in Denmark and Sweden pay the highest average social security contributions. These are not net social contributions. Furthermore, we can see two large groups of countries according to this indicator. The first large group are the states of the first and fifth cluster, where the average of the indicator is very similar and higher than in the states not yet mentioned. The second large group are the states of the second cluster. Here, on the other hand, the average net contribution per citizen is the lowest.

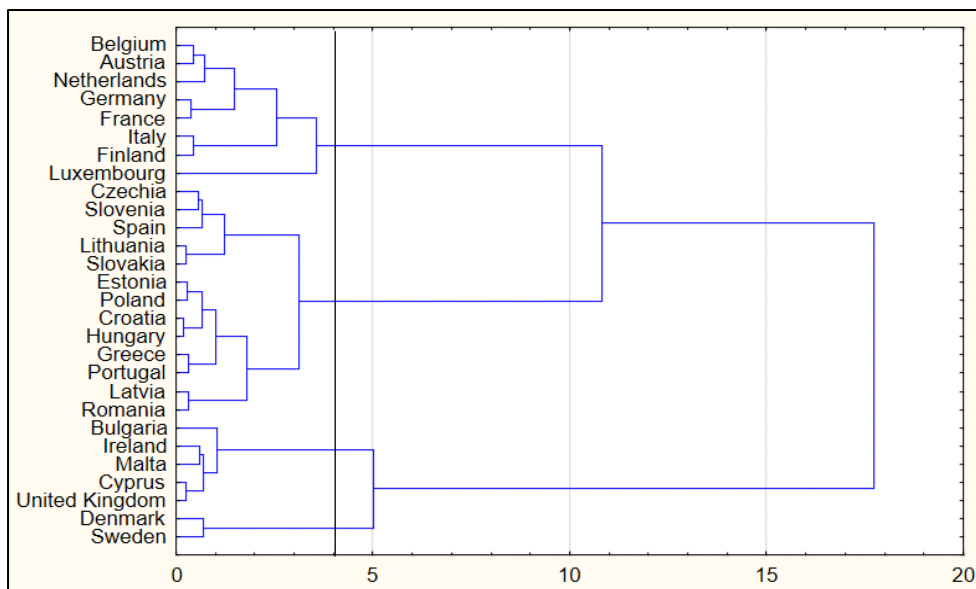
Cluster analysis in the year 2009

A total of the 28 EU countries have divided the cluster analysis into four clusters at a distance of four points. Fig. 5 shows the result of the data clustering process in the year 2009. Tab. 2 shows the average values of the monitored indicators in these clusters. We divided the EU countries into four clusters at a distance of four points.

- Cluster 1/2009: Austria, Belgium, Netherlands, Germany, France, Italy, Finland, and Luxembourg.
- Cluster 2/2009: Czechia, Slovenia, Spain, Lithuania, Slovakia, Estonia, Poland, Croatia, Hungary, Greece, Portugal, Latvia, and Romania.
- Cluster 3/2009: Bulgaria, Ireland, Malta, Cyprus, and United Kingdom.
- Cluster 4/2009: Denmark and Sweden.

In 2009 and 2019, we used the indicator of net social contributions. The situation has changed due to the choice of an indicator other than 2007. The average value of Denmark and Sweden, on the other hand, is low. In contrast, countries with low social security contributions in 2007 have the highest net average contribution.

Fig. 5 Cluster analysis in the year 2009



Source: Eurostat, 2021a + authorial computation.

Tab. 2 Average values of individual clusters in the year 2009

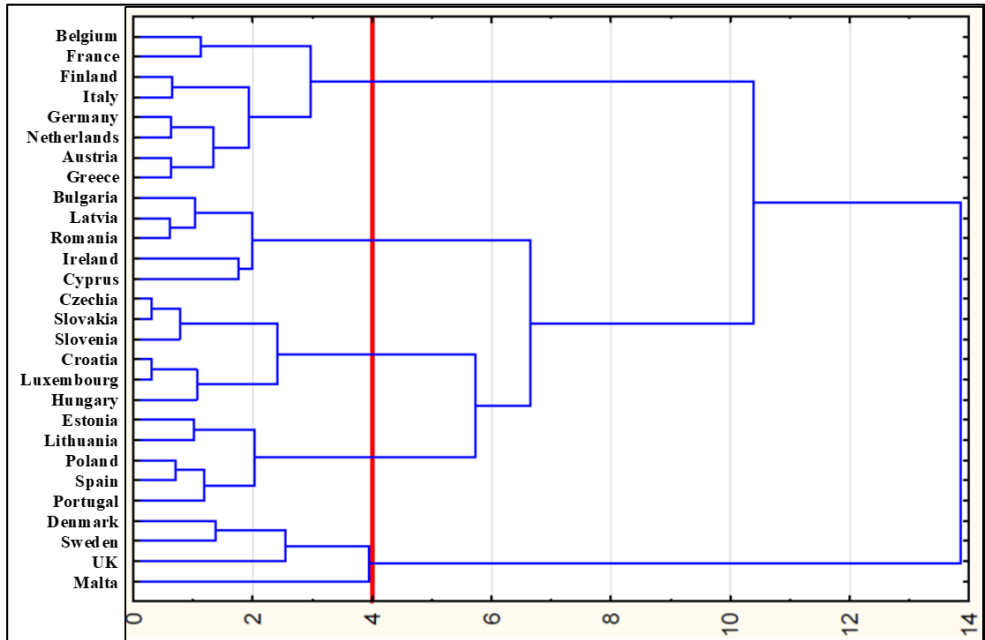
Cluster	EU country	Social contributions (EUR thousand per capita)	Percentage of net social security contributions in relation to a country's GDP (%)	Share of net income from social insurance in total tax revenues (%)
1/2009	Avg. of cluster	5.4	14.8	36.1
2/2009	Avg. of cluster	1.6	12.5	38.6
3/2009	Avg. of cluster	1.5	7.1	23.3
4/2009	Avg. of cluster	0.8	2.4	5.2
Avg. of all states	All 28 Member States	2.3	9.2	25.8

Source: Eurostat, 2021a.

Cluster analysis in the year 2016

We divided the 28 EU Member States into five groups at a distance of four points, as did Páníková (2019). Fig. 6 shows the result of the data clustering process in the year 2016.

Fig. 6 Cluster analysis in the year 2016



Source: Eurostat, 2021a + authorial computation.

Tab. 3 shows the average values of the monitored indicators in these clusters. We have grouped the countries of the European Union into five groups:

- Cluster 1/2016: Belgium, France, Finland, Italy, Germany, Netherlands, Austria, and Greece.
- Cluster 2/2016: Bulgaria, Latvia, Romania, Ireland, and Cyprus.
- Cluster 3/2016: Czechia, Slovakia, Slovenia, Croatia, Luxembourg, and Hungary.
- Cluster 4/2016: Estonia, Lithuania, Poland, Spain, and Portugal.
- Cluster 5/2016: Denmark, Sweden, United Kingdom, and Malta.

We used the indicator of social security contributions in thousands of EUR per person as in 2007. These are not net social contributions. Per capita, social security contributions increase in almost all Member States of the European Union between 2007 and 2016. We can say that the countries with the lowest and highest average contributions are the same as in 2007.

Tab. 3 Average values of individual clusters in the year 2016

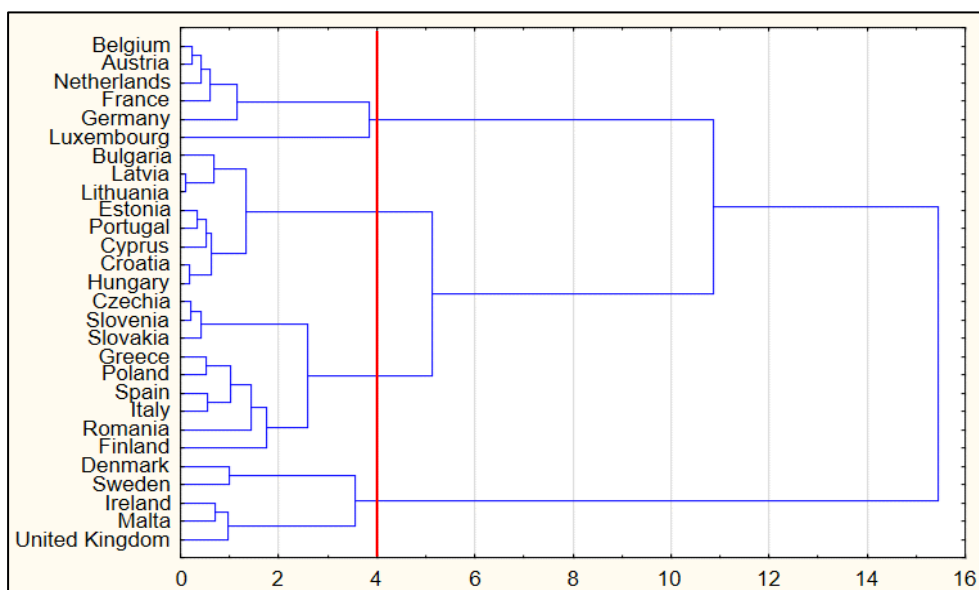
Cluster	EU country	Social contributions (EUR thousand per capita)	Percentage of net social security contributions in relation to a country's GDP (%)	Share of net income from social insurance in total tax revenues (%)
1/2016	Avg. of cluster	4.8	15.2	36.5
2/2016	Avg. of cluster	5.2	7.6	26.6
3/2016	Avg. of cluster	2.9	13.6	37.4
4/2016	Avg. of cluster	12.3	12.3	37.5
5/2016	Avg. of cluster	16.1	4.5	12.8
Avg. of all states	All 28 Member States	8.3	10.6	30.2

Source: Eurostat, 2021a.

Cluster analysis in the year 2019

We again standardized the data of the 28 countries of the European Union in the Statistica program and clustered them using Ward's method. We organized the states into four groups. Fig. 7 shows the result of data clustering in the year 2019.

Fig. 7 Cluster analysis in the year 2019



Source: Eurostat, 2021a + authorial computation.

Tab. 4 shows the average values of the monitored indicators in these clusters. We have grouped the countries of the European Union into four groups:

- Cluster 1/2019: Austria, Belgium, Netherlands, Germany, France, and Luxembourg.
- Cluster 2/2019: Bulgaria, Latvia, Lithuania, Estonia, Portugal, Cyprus, Croatia, and Hungary.
- Cluster 3/2019: Czechia, Slovenia, Slovakia, Greece, Poland, Spain, Italy, Romania, and Finland.
- Cluster 4/2019: Denmark, Sweden, Ireland, Malta, and United Kingdom.

Tab. 4 Average values of individual clusters in the year 2019

Cluster	EU country	Social contributions (EUR thousand per capita)	Percentage of net social security contributions in relation to a country's GDP (%)	Share of net income from social insurance in total tax revenues (%)
1/2019	Avg. of cluster	7.6	15.2	35.5
2/2019	Avg. of cluster	1.9	10.9	32.0
3/2019	Avg. of cluster	3.1	13.9	38.2
4/2019	Avg. of cluster	2.0	4.6	14.2
Avg. of all states	All 28 Member States	3.7	11.2	30.0

Source: Eurostat, 2021a.

We can compare the average indicators of net social contributions with the data in 2009. We recorded the lowest average net social security contributions in some southern countries, the south-eastern EU Member States and the eastern part of the Community. The highest average remains in the western part of the European Union.

Evaluation of clustering processes

According to the results of the clustering processes, we divided the Member States of the European Union into four basic groups.

- The first group includes countries most different from the other Member States of the European Union. These are the northern and island states of the European Union: Denmark, Sweden, United Kingdom, Ireland, Cyprus, and Malta. Denmark and Sweden use high taxation as well as a high degree of solidarity. These countries provide a large number of social benefits and benefits to their citizens, but they largely finance them from taxes other than social security contributions. In contrast, the United Kingdom and Ireland have a liberal type of

market economy. These states try to interfere in the social sphere as a minimum. The social benefits paid to citizens are low and the state does not have to collect high social insurance contributions. The island states of Cyprus and Malta also collect very low social security contributions.

- The second group of countries were the Members of the EU-15 before the accession of the new Member States in 2004: Belgium, France, Germany, Netherlands, Austria, Luxembourg, and Italy. These continental states represent a conservative social model. It is typical of these founding Members of the European Union to provide their citizens with social benefits and benefits on a large scale, to collect higher taxes and social insurance contributions.
- The countries of Central and Eastern Europe represent the third group of countries. Some countries that joined the European Union in 2004 or later include: Croatia, Czechia, Estonia, Latvia, Lithuania, Romania, Slovakia, and Slovenia. A common characteristic of these states is the high shares of net social contributions in total tax revenues, although the amount of net social contributions in thousand EUR per capita is among the average values.
- The fourth group is composed of the states that change their position in individual clustering processes: Spain, Greece, Portugal, Finland, Hungary, Poland, and Bulgaria. In some years, these countries are included among the countries in the second group (founding countries) and in others among the countries of Central and Eastern Europe. There is high unemployment in these countries, and therefore high dependence on social benefits. For this reason, these states charge higher social security contributions.

5 Conclusion

The system of social security coordination in the European Union consists of a set of legal norms belonging to the law of this community. These legal standards set out the basic principles in this area, which guarantee the protection of the rights of travellers and residents of the territory of the EU Member States. These rules ensure closer cooperation between social security institutions of the individual Member States while they do not replace their national legislations. Member States' principles and practices in the field of social security remain relatively stable. The authors of this article judge according to social security indicators.

Goudswaard and Caminada (2015) state that social security is important for citizens of all OECD countries. In 2014, social security contributions make up around a fourth of total tax revenue in OECD countries. The share of social security contributions in total tax revenues has increased in most countries since 1980. On average, more than a third of social expenditure in OECD countries comes from contributions. The authors point out that social security can be disruptive to the labour supply. High pay can reduce employment and may be one of the causes of

high unemployment. When citizens perceive social security more as a tax, their willingness to pay may be lower. Conversely, if citizens perceive social security as a value returned to the citizen, it will be less disruptive to the labour supply.

We consider the field of social insurance of the EU Member States to be relatively stable in the period 2007–2019. It is about stability over time. Social security contributions grow very slightly over time when expressed in EUR per person. The second indicator, the percentage of net social contributions in relation to the gross domestic product, is also growing very slightly. The third indicator, the share of net social security income in total tax revenue, fluctuates in the period under review. We can see a slight growth here as well. We can summarize according to the presented diagrams (Fig. 4 through Fig. 7) that the reviewed states do not come closer to each other in time. Short-term convergence alternates with a period of divergence. The coefficient of variation may provide more accurate convergence data, but we did not use it. We can evaluate this stability very positively in individual countries. Socially stable countries have a positive effect on people's willingness to work and increase their consumption, which can support economic growth. The results of our study confirm that the history and traditions of the country affect the established social insurance systems very significantly. The grouping of the states according to their similarity does not change much over time. The Member States of the European Union are not approaching each other. We have not addressed the issue of migrants, but the importance of this group in the European Union is growing. The number of people migrating to the European Union from third countries is growing. The study showed that absolute social security contributions are growing, but the shares of social insurance in relation to GDP and total tax revenues remain at a similar level throughout the period 2007–2019. The reason is probably the growing income of citizens.

Dwyer and Papadimitriou (2006) who dealt with the rights of older immigrants, added that improving the rights of older immigrants does not change much. The debate about social security in old age has been increasingly “Europeanised” with mechanisms such as the Open Method of Coordination, subjecting national systems of social protection to scrutiny and peer pressure. That said, the EU is still a long way from developing a coherent EU-wide system of social security for retired people.

Tepperová (2019) summarizes social security coordination rules for people working in two or more Member States. She states a set of rules for setting uniform legislation applies to social security contributions. Under these rules, one social security system is set aside and citizens pay their contributions under this system. Within this set of principles and rules, there are similarities and differences, some of which we can easily overcome, but some can have a significant impact on the final payments of the migrant compared to non-migrants. This difference can be

both positive and negative. This author examined the differences in social security between Denmark and Czechia. The results of our own study confirm large differences in these countries. We compared social security indicators from the Eurostat database.

Coordination seems to be a sufficient way to address the situation of migrants, although some shortcomings exist. As long as the numbers of migrants, especially immigrants, do not cause the country social problems to finance social security, no change is needed. A different situation occurs on the level of individuals. The migrant should have sufficient information in advance to be able to estimate the impact of a change of residence on his or her situation. Then he or she can decide accordingly.

Brîndusa (2019) concludes that the drafting of legislation in the field of social security systems coordination has constituted and still remains a very complex issue given the constraints and characteristics of the different social security systems of the Member States of the European Union. Updating the rules and aligning them with the ever-increasing phenomenon of migration is possible and necessary, and although the result may not be unanimously acceptable, we can still identify significant benefits for the citizens

In the future, we can expect changes in the evolution of the levy position in connection with the ageing of the population and immigration among the Member States or between the European Union and third countries. The whole of Europe is facing this problem. The migration of the economically active population towards Europe can bring a partial solution. At the same time, states must deal actively with this situation the best they can. Retirement age for economically active people, support for individual savings for the elderly, or increasing the share of young people in the cost of living of their parents can bring some solutions. The combination of these approaches is appropriate as it allows for the free choice and realization of citizens' preferences.

Kuszykiewicz-Fedurek (2020) evaluates the coordination positively. Updating the rules and correlating them with the ever-increasing phenomenon of migration is possible and necessary, and although the result may not be desirable, we can identify significant benefits for citizens.

In line with Dwyer and Papadimitriou (2006), we want to add that some people change their country of residence due to a higher standard of living in old age. It is likely that some retirees will be forced by this change into poverty. In this case, pensioners will choose the countries with lower price levels. The question is how an increase in the number of pensioners would affect these states. The war in Ukraine has also driven economically active people, children and old-age pensioners from

their homes. This is another call for a review of social security so that these systems remain stable.

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