



THE MUTUAL INFLUENCE OF LABOUR MARKET POLARISATION, WAGE POLARISATION AND POLITICAL POLARISATION IN THE EUROPEAN UNION

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Abstract

The aim of the paper is to prove a hypothesis concerning the dependence of the political polarisation of the European Union on recent developments in labour market structure. The labour market is undergoing changes that stem from technological progress as well as outsourcing of low-skill activities, which are causing an increase in labour market and wage polarisation. The premise is that the depopulation of the middle class is increasing political polarisation. The hypothesis is tested on a sample of 27 European Union countries from 1990 to the present using OLS with fixed effects regression analysis. Political polarization is represented by an own constructed political polarization index based on the ideological division of political parties' data of the ParlGov project (2022). The index is constructed by combining the election results and four ideological spectrums. In conclusion, the dependence of political polarisation on labour market polarisation and wage polarisation is rejected.

Keywords

Political Polarisation, Labour Market, Labour Market Polarisation, Job Polarisation, Wage Polarisation

I. Introduction

The importance of political polarisation as the ideological division of political parties and movements and the factors which could determine its development is on the rise. This paper discusses the changes in the structure of labour market and wage redistribution. These changes can be expressed in the form of labour market polarisation and wage polarisation. Labour market polarisation expresses the concentration of employment in high- and low-skill occupations and the decline in middle-skill occupations (Náplava, 2019; Nchor and Rozmahel, 2020). Wage polarisation represents the deepening disparity between high and low-wage earners (Náplava, 2022).

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The paper will examine the changes in the labour market structure and wage distribution and how they might impact the political attitudes of society. The hypotheses are that labour market polarisation and wage polarisation impact the development of political polarisation and that this impact is in a positive direction; if labour market or wage polarisation increases, political polarisation increases too. As society becomes more divided on the income and labour scale, more distinct and strong opinions can be expected. This problem is relevant for several reasons. Increased political polarisation can influence policy outcomes in a given state through legislative gridlock. The endogeneity of this relationship, which is perceived and expected by the population, influences the decisions of later voters and furthers political polarisation. The changes in the labour market structure might have several other consequences, as they can lead to tension between different classes based on their income, education and skill level. Analysing this topic can help formulate policy measures and strategies that could help prevent said conflicts and improve the functioning of the labour market and income distribution.

Thus, this paper aims to demonstrate the relevance of changes in the labour market through labour market and wage polarisation and establish the relationship of these polarisations to the political polarisation in the European Union (EU) from 1990 to the present. To determine labour market polarisation, an index was created based on changes in the ratio of the high-skilled, middle-skilled and low-skilled population according to the changes of workers in individual economic sectors using the ILOSTAT database (2022) and methodology based on papers by Náplava (2019) and Sparreboom and Tarvid (2016). A similar methodology was used for wage polarisation using OECD (2022) data to assess earnings movements between the Q90/Q50 and Q50/Q10 quantiles. The existence of labour market and wage polarisation was partially proven by descriptive analysis of data for the entire EU, but it was not possible to prove it for individual countries. Political polarisation was measured using a created index based on data from the ParlGov project (Döring and Manow, 2022), which divides individual parties according to their ideological spectrum. The results showed that wage polarisation was not significant for any of the models, and its influence on political polarisation can therefore be rejected. Labour market polarisation was significant in all selected models but with the opposite effect than what would correspond to economic theory.

Despite the fact that the paper does not confirm the hypotheses, it is possible to find its benefit in the contribution of a unique self-constructed political polarisation index, which allows a comprehensive and, most importantly, easily replicable view of the evolution of voting decisions in relation to various external influences. Thus, it extends the author's previous work (Rolník, 2023), which successfully used only one ideological spectrum, namely the left-right spectrum, for political polarization research. It thus paves the way for further research that can focus on a more detailed analysis, for example, at the regional level. At the same time, the paper uses a new perspective on labour-market and wage polarisation research, where the polarisation indexes constructed can be used in further analyses of labour market developments not only in connection with political polarisation.

II. Literature Review

Basis of political polarisation

Political polarisation refers to the increasing gap between political parties and ideologies, resulting in a more divided and contentious political landscape (Sulmont, 2021; Dalton, 2020; Hibbing and Theiss-Morse, 2002). It is a phenomenon that has been linked to various negative outcomes, such as reduced political participation and increased societal conflict (Sulmont, 2021; Heltzel and Laurin, 2020; Pew Research Center, 2014).

The very definition of the term polarisation is addressed by DiMaggio et al. (1996). Polarisation can be understood from two points of view, first as a state quantity, expressing different and opposite opinions of two or more subjects. Polarisation, defined in this way, expresses its value relative to a certain theoretical maximum of disagreement with the given argument. The second perspective is the view of polarisation as a process where it is necessary to determine its degree. This is how the development of the subjects' disagreement over time is monitored. Based on the alignment perspective, political polarisation can also be viewed as the degree to which citizens' positions on a given issue are defined by their partisan or ideological identity (Dalton, 2021; Abramowitz and Saunders, 2008).

Political polarisation has increased in many countries over the past few decades (Riera and Madariaga, 2023; Weber, 2021; Abramowitz, 2010; Fiorina, Abrams and Pope, 2005). Political polarisation is often associated with increased ideological differences between parties as well as increased hostility and intolerance towards those with different political views, namely with negative voting (Riera and Madariaga, 2023; Weber, 2021; Druckman, Peters and Slothuus, 2013; Iyengar, Sood and Lelkes, 2012). It can also have negative consequences for democratic governance, as it can lead to gridlock and an inability to compromise on important issues (Levitsky and Ziblatt, 2018; Fiorina, Abrams and Pope, 2005).

As discussed in Rolník (2023), political polarization can be viewed from several perspectives, which together form a so-called 'cycle of polarization'. The cycle starts as 'institutional polarisation', which combines biased information from the media and social media and the strong influence of external factors (e.g. economic crisis) on voters' opinions. This is exploited by political elites who present more extreme views in order to further divide society and win new voters (Wilson et al., 2020). The next step is 'false polarisation', which represents misconceptions between belief groups and the false belief that other groups have opposing views on given policy decisions, leading to an amplification of extreme views among all participants in the electoral process (Wilson et al., 2020, Ahler and Sood, 2018, Westfall et al., 2015). This is followed by 'affective polarisation', which reflects the degree to which each group avoids the arguments and opinions of the opposing groups and the degree to which they do not trust and avoid these different views (Iyengar et al., 2019, Chen and Rohla, 2018). The last stage can be considered as 'ideological polarisation', but it is only partially influenced by affective polarisation. The latter reflects the longer-term ideological position of individuals and a more enduring affiliation with an elected party based on internal beliefs (Wilson et al., 2020). This ideological position combined with affective polarisation leads to the final voting decision and thus this paper will use ideological polarisation to represent the observed political polarisation values.

The link between political polarisation and the economic situation of the state

In order to be able to examine the determinants of political polarisation for this work, it is also important to explain the direction in which polarisation works, meaning the endogeneity of the relationship between political polarisation and the economic state of the country. Therefore, it is a basic determination of whether polarisation will be an explained variable in the practical part of the work (as the work assumes on the basis of the literature), or whether it will be necessary to reverse the dependence, i.e. whether polarisation must be one of the explanatory variables.

This issue is addressed by Millikovic and Rimal (2008), Proaño Acosta et al. (2019), Alesina et al. (2017) and Rogowski (2015). They find that political polarisation is caused by the economic situation in the respective country. If there are good socio-economic conditions in the country, a change in the political set is unlikely. Under conditions of low economic performance of the country, the traditional and centrist parties are penalised by the outflow of voters. The government has the option of changing policies to support economic growth as well as the amount and rate of income redistribution. Strong left parties and populist and radical parties benefit from increased unemployment values, while higher amounts of income inequality record votes for more extreme right-wing parties.

One possible explanation for this relationship is that economic crises can lead to increased competition for resources and pressure on the government to address economic challenges, leading to greater political polarisation (Alesina et al., 2017). For example, during economic downturns, there may be disagreement over which policies would best stimulate economic recovery or debate over how to distribute the burden of economic adjustment among different groups (Dalton, 2021; Grechyna, 2021; Alesina et al., 2017). These debates can lead to greater ideological divides and political polarisation (Dalton, 2021; Alesina et al., 2017).

Changes in labour market structure and the related changes in the wage distribution structure

It is important to examine the link between labour market structure changes and wage distribution to political polarisation because changes in labour market structure and wage distribution can have significant economic and social consequences. Understanding these changes can help policymakers address any negative impacts and promote economic and social stability (Cameron and Gelbach, 2016; Doerrenberg and Weber, 2014). This can help policymakers understand the underlying drivers of these changes and identify potential solutions to address any negative impacts (Cameron and Gelbach, 2016; Doerrenberg and Weber, 2014). Research on this topic may identify specific policies or initiatives that can promote a more stable and equitable labour market and distribution of wages or highlight the need for broader structural reforms to address persistent economic challenges (Cameron and Gelbach, 2016; Doerrenberg and Weber, 2014).

Thus, the hypotheses are that changes in labour market structure and related wage distribution impact the development of political polarisation. The changes are expressed in the form of labour market polarisation and wage polarisation, and this impact is in a positive

direction, so if labour market or wage polarisation increases, political polarisation increases too. Higher labour market and wage polarisation can lead to an increase in income inequalities. The hypotheses are based on the literature on the dependence of political polarisation development on inequalities, particularly income inequality, as the direct link between these various polarisations has never been researched. The relationship between political polarisation and income inequalities has been researched and confirmed, for example, in works by McCarty et al. (2003), Gu and Wang (2022), Iversen and Soskice (2015), Gunderson (2022) and Polacko et al. (2021).

Labour market polarisation

The topic of labour market polarisation is addressed in the work of Náplava (2019), Nchor and Rozmahel (2020) and Goos et al. (2009), which discuss the concept of the theory of job polarisation. This refers to the trend of employment growth in high- and low-skill occupations and the decline of employment in middle-skill occupations (Nchor and Rozmahel, 2020; Autor, Katz, and Kearney, 2006). There are two main streams of explanation for job polarisation taking place. The traditional skill-biased technological change (SBTC) hypothesis, which is based on the demand of workers growing in proportion to their skills (Autor, Levy, and Murnane, 2003; Goos et al., 2009), suggests that higher technology engagement in production leads to higher demand for skilled labour that is able to operate the new technology. The reason for the emergence of a second approach, the routine-biased technological change (RBTC), is that SBTC cannot explain the recent job polarisation phenomenon (Náplava, 2019). The RBTC (Autor, Levy, and Murnane, 2003; Goos et al., 2014) suggests that the recent technological change leads to the replacement of workers in routine occupations, which is linked mainly to middle-skill workers (Nchor and Rozmahel, 2020). Routine occupations can be easily automated and offshored (Autor, Levy, and Murnane, 2003). Confirmation of the job polarisation hypothesis based on the RBTC hypothesis is unclear. For example, according to Nchor and Rozmahel (2020), the results for Central and Eastern European countries are not compelling, and the slight decline in middle-skill workers that appears is the same as the results of Oesch, Rodriguez and Menez (2011). In contrast, Náplava (2019) and Goos et al. (2014) confirm the hypothesis. Further research on the relevance of labour market polarisation to political polarisation should therefore begin with at least a basic determination of whether labour market polarisation is relevant according to the RBTC hypothesis.

Wage polarisation

Wage polarisation is closely linked to job polarisation and refers to an increase in wages at the high and low ends of the wage distribution while wages in the middle range grow more slowly (Pi and Zhang, 2021; Reinhold, 2016; Croci Angelini et al., 2009; Autor, Levy, and Murnane, 2003). It is associated with wage changes and is based not only on the traditional SBTC hypothesis, which states that technological change favours those who are more skilled and educated, leading to an increase in demand for them and

thus to an increase in their wages (Autor and Dorn, 2013), but also on the increase in wages of low-skilled workers, which is associated with an increase in the relative demand for their labour because of global outsourcing and offshoring (Antonczyk, DeLeire, and Fitzenberger, 2018). Wage polarisation is thus directly linked to wage inequality, and due to these two influences, the wage ratio Q90/Q50 (upper-tail inequality) and the wage ratio Q50/Q10 (lower-tail inequality) from the paper by Náplava (2022) are used to study wage polarisation. Q90 expresses the upper wage decile, Q50 expresses the median wage decile and Q10 expresses the lower wage decile. It is important to note that despite the fact that wage polarisation is related to job polarisation, this relationship is not fully confirmed, as whenever job polarisation occurs, there is no evidence that there also will be an occurrence of wage polarisation (Goos and Manning, 2007; Naticchioni, Ragusa and Massari, 2014). Therefore, confirmation of the existence of wage polarisation is still controversial, especially as research is usually devoted to individual states and uses various methods. For example, the occurrence is confirmed by Wang et al. (2021), Cortes (2016) and Dustmann, Ludsteck and Schönberg (2009), while it is opposed by Náplava (2022), Antonczyk, DeLeire and Fitzenberger (2018) and Charnoz, Coudin and Gaini (2011). As with labour polarisation, it is appropriate to have insight into the evolution of wage polarisation and its existence for EU countries and have the dataset under study before analysing its association with political polarisation, which will be implemented in the results section of the paper.

III. Data and Methodology

This paper uses unique datasets from the EU (27 states) for all years in which elections were held from 1990 to 2022 to analyse the political polarisation index, which was created by the author and was based on the ParlGov project (Döring and Manow, 2022) and inspired by Dalton (2008).

Formation of political polarisation index

To prove the hypothesis about the influence of labour market and wage changes on political polarisation, we must first determine how the explained variable of political polarization will be constructed. The polarisation index is designed as a simple average of four calculated polarisation indexes and is based on the ideological spectrums of the left-right division of political parties, the liberal authoritarian spectrum, the liberal interventionist spectrum and the spectrum of attitude towards European integration. The ParlGov project places each party in the electoral process (using data from parties that exceed 2% of the total votes in one election year during the entire examined period) on a given ideological spectrum with values from 0 to 10 expressed as integer numbers, which are then transformed into values from -5 to +5. This means that extremely negative values indicate the most left-wing parties, the most inclined to an authoritarian leadership style, those leaning towards interventionism, parties that are most strongly against European integration and, on the opposite side of the spectrum, it brings together right-wing, liberal and pro-European parties. For each spectrum, country and election year, the parties are divided into groups according to the indicated values, their summed-up election results are

multiplied by the absolute value of this group (thus 0–5, which serves as the polarisation weight), and the result for given ideological spectrum is summed up and divided by 100 for better clarity. The individual polarisation indexes (left-right, liberal-authoritarian, liberal-interventionist and the pro-European integration index) are then averaged together for the given state and election and then form the resulting analysed polarisation index. To give an example, simplified to just one ideological spectrum, e.g., left-right spectrum, if a party that is at the exact centre of the values gets 20% of the vote in a given election in a given state, its results will be multiplied by the “weight” of the ideological spectrum of 0. If, in this election, parties of the extreme right (valued at +5) received 50% of the vote in total and parties of the extreme left (valued at -5) received 30% of the vote in total, and no other parties received any votes, the left-right polarization spectrum index will have a value of 4. If in these exact elections the other indexes calculated are as follows: liberal-authoritarian index valued at 3; liberal-interventionist index at 2, index of attitude towards European integration at 1, the final polarisation index for given elections will be the average of 2.5. This process is repeated for each election in each state separately, resulting in a dataset of the political polarization index.

Formation of main explanatory variables: labour market and wage polarisation indexes

According to the research, the main explanatory variables are indicators of changes in the labour market. These are mainly the labour market polarisation index based on ILOSTAT data (2022), the wage polarisation index based on OECD data (2022) and the GINI index of income inequality (World Inequality Database, 2022). Data from the year preceding the election year are used, the same as in the case of control economic variables according to Polacko et al. (2021) regarding the influence of income inequalities and Funke et al. (2016) regarding political changes after financial crises. The GINI index is pre-calculated and available according to the World Inequality Database (2022) and requires no further processing of the data. The process of calculation of the labour market and wage polarisation indexes is as follows.

The labour market polarisation index is a combination of data processing based on the work of Náplava (2019) and the calculation method based on the work of Sparreboom and Tarvid (2016). ILOSTAT data (2022) from the International Standard Industrial Classification (ISIC) of All Economic Activities are used, which contain the classification of economic activities according to the actions they carry out, along with data on the absolute number of employees in the given sector. Based on papers by Náplava (2019) and Amoroso and Moncada-Paterno-Castello (2018) on labour market polarisation, the individual groups are then divided into ‘skill’ groups according to the necessary skills and repetitiveness of the work (see Table 1) and the number of employees in each group is summed up.

Table 1: The division of ISIC (NACE) classification of economic activities due to the required skills

High-Skills	Middle-skills	Low-skills
J	A	E
K	B	I
L	C	N
M	D	S
O	F	
P	G	
Q	H	

Source: Náplava (2019) and Amoroso and Moncada-Paterno-Castello (2018)

Note: Náplava (2019) and Amoroso and Moncada-Paterno-Castello (2018) exclude the “R” industry, expressing the categories Arts, Entertainment and Recreation, it is therefore also omitted in this work.

A = Agriculture, Forestry and Fishing; B = Mining and quarrying; C = Manufacturing; D = Electricity & gas; E = Water and sewerage; F = Construction; G = Wholesale and retail trade; H = Transport and Storage; I = Hotels & catering; J = Information and Communication; K = Financial intermediation; L = Real Estate; M = Professional, Scientific and Technical activities; N = Administrative and Support Service activities; O = Public administration and defence; compulsory social security; P = Education; Q = Health and social work; R = Arts, Entertainment and Recreation; S = Other service activities

The papers from Náplava (2019) and Amoroso and Moncada-Paterno-Castello (2018) work with the division of NACE (Eurostat, 2022), a classification of economic activities published by the European Commission. However, this database does not contain all data from the examined years of research, so the ILOSTAT (2022) database was used since, according to Jean-Marc Rollet (2009), the breakdown into main groups in both databases is comparable. However, the ISIC database contains another problem: the transition from the Rev 3.1 classification to the Rev 4 classification (ILOSTAT, 2022). These different versions were harmonised due to the methodology of Rev. 4 (these differs in the classification of some of the subgroups in order to be able to respond to the current progress of the economy, for example, the category J – ‘Information and communication’, is created) according to the methodology of the United Nations Statistics Division (2008). Based on these divisions, percentage changes from base year of 1989 in the share of individual groupings (high-skill, middle-skill and low-skill) on the total workforce in individual countries were calculated. For each observation, a job polarisation index was created based on the calculation from the paper by Sparreboom and Tarvid (2016), which analyses unbalanced job polarisation and skill mismatches in Europe. This index is calculated as follows:

$$labour_polarisation = \frac{1}{2} \times (\Delta ls_{1989} + \Delta hs_{1989}) \times (1 + |\Delta hs_{1989} - \Delta ls_{1989}|) \times 100 \quad (1)$$

where Δls_{1989} is the change in the percentage share of low-skill workers to total workers relative to the base year 1989 (the first year of observation utilising data from one year before the election year), Δhs_{1989} is the change in the percentage share of high-skill workers to total workers relative to the base year. The first parenthesis expresses the change in medium-level jobs (overall change), and the second expresses the imbalance in high/low-level jobs. Compared to the index created by Sparreboom and Tarvid (2016), the moving average of five years is not used to create individual values of deviations, but the deviation from the base year 1989 is used.

The wage polarisation index is created according to the same methodology as Sparreboom and Tarvid (2016) and is based on further research by Náplava (2022), which deals with wage polarisation at the level of the Czech Republic. OECD data (2022) of Q90/Q50 and Q50/Q10 decile ratios of gross earnings are used. According to Náplava (2022), an increase in the Q90/Q50 ratio represents an increase in wage polarisation as the number of people falling into the Q90 income quantile increases or the Q50 median quantile decreases (depopulates). Reduction of the Q50/Q10 quantile means an increase in wage polarisation as either the median Q50 quantile decreases or the number of people falling into the low-wage Q10 quantile increases. Deviations from the 1989 base are calculated again, which are then used in the calculation of the wage polarisation index:

$$wage_polarisation = \frac{1}{2} \times (-\Delta lw_{1989} + \Delta hw_{1989}) \times (1 + |\Delta hw_{1989} - (-\Delta lw_{1989})|) \times 100 \quad (2)$$

where $-\Delta lw_{1989}$ is the change in the percentage share of Q50/Q10 compared to the base year 1989 (the minus sign is used because due to the opposite direction of the expression of increases in wage polarisation, as a decreasing ratio means an increase in wage polarisation), Δhw_{1989} is the change in the percentage share of Q90/Q50 compared to the base year 1989. The labour polarisation and wage polarisation indices are logarithmised for the final analysis to suppress deviations caused by high data variability. The OECD data (2022) were partially incomplete, and the missing data for part of the 90s were added by fitting the values of the following 10 years with a linear trend.

Description of the control variables used and the composition of the final model

The control economic variables are secondary data that do not require further considerable calculations. The variables are: trade openness (expressing the process of globalisation and the involvement of the given state in it), gross national income (GNI), gross domestic product (GDP) and disposable income of households. Due to the detected multicollinearity, the GDP, GNI and disposable income variables are not included in the analysis at the same time, as they are based on a similar foundation. The trade openness variable is the sum of exports and imports of goods and services as a per cent of GDP (World Bank, 2022), and due to different and sometimes high values, this variable was logarithmised. The

variables GNI per capita in 2017 PPP \$ (UNDP, 2022), GDP per capita in 2021 PPP € (WID, 2022) and adjusted gross disposable income of households in real terms of euros per capita (Eurostat, 2022) are also logarithmised. Economic variables related to the state of economic welfare (well-being) as control variables are used in the studies of Polacko et al. (2021), Akdede (2012) and Alt and Lassen (2006). GDP and trade openness is used in Lindqvist and Östling (2010) and Doležalová et al. (2017).

As controls, this paper used socio-demographic variables for the variable turnout of given elections (in per cent due to the given National Statistical Offices), the share of the population over the age of 65 in per cent (Eurostat, 2022) and individual shares of the population according to their education in per cent (Eurostat, 2022). These shares are divided according to the Eurostat methodology (2022) into the population with primary, secondary and tertiary education. The primary education variable is represented by the share of the population that reached lower secondary education and covers less than primary, primary and lower secondary education levels 0–2 according to the methodology of Eurostat (2022); the secondary education variable represents levels 3–4, which are upper secondary and post-secondary non-tertiary education; tertiary education variable represents levels 5–8 according to the Eurostat (2022) classification. Education control variables use McCarty et al. (2003). The turnout variable is used in the paper by Polacko et al. (2021) and Lindqvist and Östling (2010), while age and education variables are used in the paper by Jerrim and Macmillan (2015), Stanig (2013) and Hayo and Seifert (2003). The education variable is also emphasised in the paper of Sulmont (2021).

The regression model used for all the studied states of the EU is as follows: $Polarisation_{i,t}$ is an explained variable where $i = 1, 2, \dots, 27$ for the given states, and $t = 1990, 1991, \dots, 2022$ for the election years (7–10 observations for the given state). The basis of the polarisation index has been explained above. α_i represents the constant, β_j the regression coefficient, and ε_i the random component. The main explanatory variables are $labour_pol_{i,t}$, which expresses the polarisation of the labour market, $wage_pol_{i,t}$, which represents the wage polarisation, and $GINI_WID_{i,t}$, which denotes the GINI coefficient. $labour_pol_{i,t}$ and $wage_pol_{i,t}$ are negative phenomena that indicate changes in society in terms of its well-being. Therefore, a positive dependence of the political polarisation index can be expected if increasing labour market polarisation and wage polarisation increases political polarisation. Increased values of the GINI coefficient will have the same effect. Further, this paper uses control economic variables $GINI_PPP_{i,t}$ for gross national income; $GDP_PPP_{i,t}$ for gross domestic product and $dis_income_{i,t}$ for disposable income of households. Variables of $GINI$, GDP and disposable income are treated separately and are expressed in the regression model as variable $Xa_{i,t}$. All these variables have an expected negative link with political polarisation, as when they increase, voters' objective and subjective well-being will improve, and the index of political polarisation will decrease. Control socio-demographic variables are represented by $turnout_{i,t}$ as voter turnout, $65_plus_{i,t}$ as the share of the population older than 65 years and $edu_primary_{i,t}$, $edu_secondary_{i,t}$ and $edu_terciary_{i,t}$. The education variables are expressed in the regression model as variable $Xb_{i,t}$. The expected effect of the variable $turnout_{i,t}$ will be negative; the higher the turnout, the more the opinions will be distributed

along the spectrum, and the political polarisation will decrease. Variable $65_plus_{i,t}$ will have a positive effect on political polarisation; higher participation of voters over 65 years of age will result in increased values of political polarisation, as they vote for parties focusing on social politics that help the older generation and are more often more radicalised. Education variables will have an escalating effect; it is expected that the least educated portion of the population is more easily influenced by extreme views of the parties, and a larger share of this population will result in higher polarisation. In contrast, a more moderate choice can be expected for the population with tertiary education. The regression model will be used in the following form:

$$Polarisation_{i,t} = \alpha_i + \beta_1 GINI_WID_{i,t} + \beta_2 labour_pol_{i,t} + \beta_3 wage_pol_{i,t} - \beta_4 Xa_{i,t} - \beta_5 trade_open_{i,t} - \beta_6 turnout_{i,t} + \beta_7 65_plus_{i,t} - \beta_8 Xb_{i,t} + \varepsilon_i \quad (3)$$

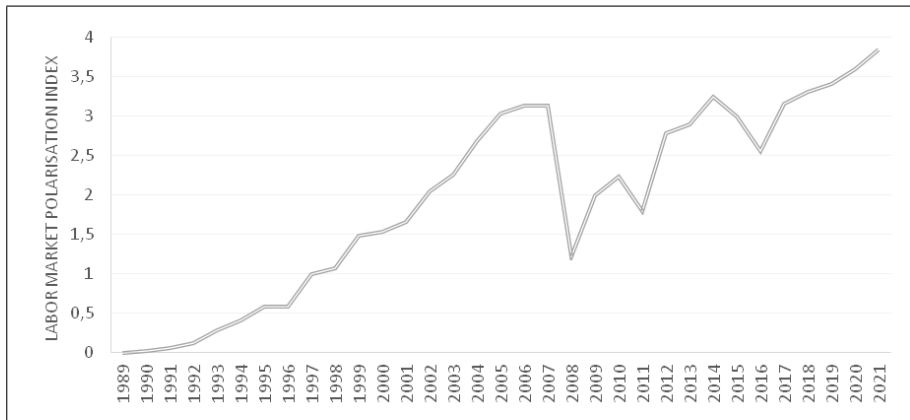
For processing, the OLS method with fixed effects (with and without time variables) is used, which is most suitable for panel data of a similar type, as well as the LSDV OLS method, which incorporates dummy variables representing individual states. The method uses region-fixed effects for each of the 27 states of European Union and time-fixed effects for each year the elections take place. The paper uses these effects to correct the variables that change over time and to specify the effects of any regional specific differences between the states.

IV. Results and Discussion

The dataset was analysed to understand the development of the main explanatory variables, the labour market polarisation index and the wage polarisation index. This analysis was based on averaging the data for all of EU for the labour market and wage polarisation indexes.

As can be observed in Figure 1, the evolution of the constructed labour market has an upward trend and, as this is in line with the research of Náplava (2019), it can be concluded that labour market polarisation is a current, demonstrable and observable phenomenon. However, the largest break can be observed in 2008, which is due to the nature of the data when the ISIC Rev 3.1 methodology was changed to ISIC Rev 4. The 2011 turning point could be the result of the 2008 financial crisis when negative economic shocks could have only just been felt in the labour market. The constructed labour polarisation index responds strongly to the decline in employment in low-skilled and high-skilled sectors but cannot properly account for a similar trend in middle-skilled labour workers. The observed decline thus could be related to the new wave of unemployment that has hit all skill groups (Dong, 2023; Guichard and Rusticelli, 2010). Nevertheless, it might be concluded that the growth of polarisation of the labour market is linked to the positive economic development of the states. The turning point of 2016 may be a reaction to the migration crisis of 2016, which brought new working forces to the European labour market.

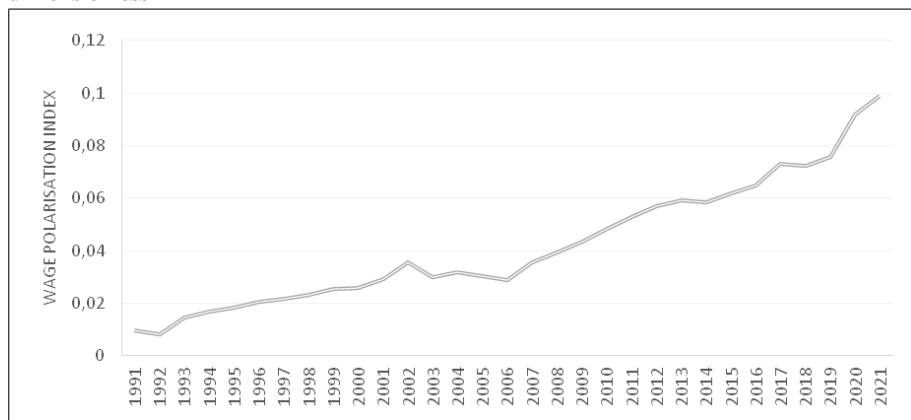
Figure 1: The development of the labour polarisation index from 1989 to 2021 for the EU; dimensionless



Data source: ILOSTAT (2022)

The evolution of the wage polarisation index (EU average) can be observed in Figure 2. As in the previous Figure 1, a clear upward trend can be identified. Again, it can be concluded that wage polarisation is a current trend, although research by Náplava (2022) has not confirmed its relevance. It shows a minor break after 2001 when the dot-com bubble burst and a crisis followed. In such an economic crisis, none of the income classes benefits; therefore, wage polarisation may have decreased after a year. This development lasted until almost 2008, the year of the following global financial crisis. It was followed by a slight decline again in 2017 (as with labour market polarisation, which may be due to the EU migration crisis), and it persisted until 2019. The similarity of the development of the two indexes is therefore evident, and apart from the direct link to political polarisation, it is the presumed dependence of these indexes on the indicators of national economic growth that might be of interest for further analysis. Based on the literature (McCarty et al., 2003; Gu and Wang, 2022; Iversen and Soskice, 2015; Gunderson, 2022; Polacko et al., 2021), the dependence of political polarisation on a country's economic development and emerging inequalities is likely, and the direct dependence of political polarisation on the indexes of labour market polarisation and wage polarisation is also likely.

Furthermore, a comparison of the evolution of these indexes on the map of the EU is shown in Appendix (Figures A1–A6), using the average of 10 years of development since the beginning of the period analysed and the average of 10 years at the end of the period analysed.

Figure 2: The development of the wage polarisation index from 1989 to 2021 for the EU; dimensionless

Data source: OECD (2022)

The paper further explores the link between political polarisation and labour market and wage changes through regression analysis. The dataset contains 232 observations (7–10 observations for a given state); after adjusting and logarithming some variables, only 129 to 182 observations were used in the analysis. A quadratic form of these variables was used for the labour market and wage polarisation variables (after logarithmic modelling), as this variable does not have an inherently linear trend. These results were by far the most convincing. The best results were obtained in the case of the OLS method with fixed effects, and the top 6 models are shown in Table 2.

Table 2: Estimation of the linear regression models – influence on political polarisation. For model 4: 182 observations; for the rest of the models: 129 observations. 27 cross-sectional units. *, **, and * denote significance levels of 10 %, 5 %, and 1 %, respectively. t-statistics are reported in parentheses below the coefficient**

	Model 1	Model 2	Model 3
const	2.10964*** (2.755)	2.07277** (2.470)	2.10594*** (2.735)
GINL_WID	0.0186630*** (3.568)	0.0184895*** (3.370)	0.0184206*** (3.296)
log_labour_pol	−0.0199153** (−2.128)	−0.0197862** (−2.088)	−0.0198119** (−2.099)
sq_log_labour_pol			
wage_pol			

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log_wage_pol	0.0135744 (0.7851)	0.0143200 (0.7679)	0.0143948 (0.7769)
sq_log_wage_pol			
GNI_PPP	-0.181404 (-0.9926)	-0.180734 (-0.9835)	-0.181511 (-0.9883)
log_trade_open	0.0602387 (0.6800)	0.0646180 (0.6628)	0.0655443 (0.6671)
turnout	-0.00372795* (-1.794)	-0.00371192* (-1.773)	-0.00370244* (-1.764)
65_plus	0.00184894 (0.2220)	0.00215068 (0.2442)	0.00227015 (0.2523)
edu_primary		0.000324886 (0.1102)	
edu_secondary	-0.00302256 (-1.122)	-0.00285482 (-0.9193)	-0.00316868 (-1.078)
edu_tercial			-0.000380565 (-0.1275)
time dummy: year	no	no	no
LSDV R2	0.807104	0.807128	0.807136
Within R2	0.263847 <i>n</i> = 129	0.263937 <i>n</i> = 129	0.263968 <i>n</i> = 129
	Model 4	Model 5	Model 6
const	4.19573*** (3.946)	0.562935 (0.3905)	0.811064 (0.5446)
GINI_WID	-0.00519447 (-0.8146)	0.00773998 (1.048)	0.00611510 (0.7872)
log_labour_pol	-0.0468777*** (-2.737)	-0.0399198** (-2.097)	-0.0404037** (-2.113)
sq_log_labour_pol	-0.0105472*** (-3.605)	-0.00733996** (-2.351)	-0.00704681** (-2.229)
wage_pol	0.0675687 (0.4345)		
log_wage_pol		0.00412955 (0.1817)	0.0448242 (0.7204)

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sq_log_wage_pol			0.00571024 (0.7030)
GNI_PPP	−0.377804* (−1.981)	0.111665 (0.4379)	0.112270 (0.4386)
log_trade_open	0.0320820 (0.2879)	−0.0327466 (−0.2555)	−0.0534797 (−0.4052)
turnout	−0.00456936** (−2.168)	−0.00422619* (−1.744)	−0.00409806* (−1.680)
65_plus	0.00393181 (0.2772)	0.0329028** (2.132)	0.0346544** (2.209)
edu_primary			
edu_secondary	−0.00278597 (−1.033)	−0.00103954 (−0.3392)	−0.00216739 (−0.6247)
edu_tercial	−8.43065e-05 (−0.01949)	0.00841953* (1.883)	0.00830044* (1.848)
time dummy: year	yes	yes	yes
LSDV R2	0.896626	0.893005	0.893789
Within R2	0.403369 <i>n</i> = 182	0.591673 <i>n</i> = 129	0.594662 <i>n</i> = 129

Data source: *ParlGov* (Döring and Manow, 2022), *ILOSTAT* (2022), *World Bank* (2022), *OECD* (2022), *World Inequality Database* (2022), *Eurostat* (2022)

All models show the same problem in statistical verification, namely heteroskedasticity. Different functional forms of the models (quadratic and logarithmic) were tested, but the problem was not solved. The first three models above also have the problem of not fulfilling the normality of the data. RESET and LM tests of the correct model specification cannot be performed. Final models were selected based on the coefficients of determination as the information criteria (AIC, BIC, HQC) could not be used. Also, autocorrelation tests cannot be performed, as in some cases, the number of observations is smaller than the number of parameters.

Models 4 and 6 were selected as the final models. Model 4 does not have the best coefficient of determination but contains the largest number of significant variables at the 5% significance level. Model 6, on the other hand, has the highest coefficient of determination. For model 4, the significant variables are labour polarisation, gross national income at the significance level of 10% and voters' turnout. As far as GNI is concerned, the effect on political polarisation is consistent with economic theory. This variable is also significant in 4 of the 6 models. Furthermore, the socio-demographic control variable voters' turnout, which is significant at the 5% significance level (at the 10% significance level in the other selected models), is also consistent with the above theory.

For model 6 (and model 5), the GNI variable is insignificant. However, labour market polarisation, voters' turnout, the share of the population older than 65 years and the share of the university-educated population (tertiary education) are significant. The share of the tertiary educated population is significant just on the 10% level, and a positive effect on political polarisation can be observed. This effect is opposite to the theory that political polarisation will also increase when the share of the tertiary educated population increases. This may be since this part of the population separates itself in opinion from the mainstream and votes for parties that may be more pronounced on specific issues.

The variables wage polarisation, disposable income and the share of the primary and secondary level educated population are not significant in any of the models shown. The income inequality GINI coefficient variable is significant only in the unused models 1–3. Further research would benefit from using additional control variables to capture the state of labour market changes better or from including a smaller than whole EU analysis at the regional level to better show inequality between regions, as countries are internally heterogeneous. It would also be helpful to include other indicators of a country's economic situation, such as the effects of inflation on perceptions of wage levels.

One of the main explanatory variables, namely the labour market polarisation variable, needs more attention. It is significant at least at the 5% significance level in all models. However, in each of the models, it appears with the opposite effect to what would be consistent with economic theory. Thus, the hypotheses that labour market polarisation and wage polarisation have an impact on the development of political polarisation and that this impact is in a positive direction must be rejected. Different modifications of the dataset were tried: logarithmic and squared values of these indicators; adjusting for outliers in the data; time lags of these values by 1–4 years from the election year; and methods of analysis: different functional forms of the models (linear, quadratic, log); LSDV OLS with the inclusion of state dummy variables as well as the fixed effects method without and with the inclusion of time dummy variables. However, these measures produced a similar result.

The existence of labour market polarisation has already been demonstrated (Náplava, 2019; Goos et al., 2014), but can be partly observed as well as wage polarisation (demonstrated by Wang et al., 2021; Cortes, 2016; Dustmann, Ludsteck and Schönberg, 2009) in the descriptive analysis of this paper. As far as the regression analysis is concerned, the problem may be the insufficient number of variables used to represent the state of the labour market adequately, and the inverse relationship demonstrated is most likely only apparent. It may also be due to the low labour market flexibility typical of the European Union (Nchor and Rozmahel, 2020). Many high employment tools can cause that, i.e., the defences against unemployment in the form of trade unions, the changes and measures they promote against redundancies, and the high unemployment support. Also, the impact of labour market changes is relatively long-term. Thus, the question is whether workers and society can perceive these observed changes and with what lag to include these changes in the analysis (a lag of 1–4 years was insignificant). Thus, interesting data that could bring further insight into the issue could be, for example, the degree of union coverage of the labour market, the rate of layoffs, the speed and rate of finding a job, the number of

unemployment benefits, and the number of recipients of such benefits, indexes reflecting the degree of the welfare state, or other expressions of labour market flexibility.

V. Conclusion

The first objective was partly achieved through descriptive data analysis, where labour market and wage polarisation can be observed through averaged data from the whole EU. As far as individual countries are concerned, it is not possible to provide conclusive evidence. Through regression analysis, political polarisation was measured by a self-constructed index based on data from the ParlGov project (Döring and Manow, 2022), which includes a division of the parties into different ideological spectrums. Wage polarisation was insignificant for each of the models examined, and its effect on political polarisation can therefore be rejected. Labour market polarisation is significant in all of the chosen models, but with the opposite effect to what is suggested by economic theory. Therefore, this effect must be treated as an apparent dependency, and the given hypothesis must be rejected. The negative dependence (when labour market polarisation increases), which implies the depopulation of the middle social class as the main bearer of the votes of elections (political polarisation decreases), is simply not explainable. As for the control variables, political polarisation has been shown to be dependent on voter turnout, GNI, 65 years and above's share of the population and the share of the population with tertiary education.

However, rejecting the hypothesis of the impact of changes in the labour market and wage income structure on political polarisation does not mean that a link may not exist. It is possible that the hypothesis based on voting shifts and depopulation of the middle-income class is flawed and that it makes sense to focus on other income classes in today's modern developed economies where opinion formation in elections may be based on different determinants and more strongly influence election outcomes, since the middle class may no longer be the main bearer of changes in the electoral preferences of society. Further, the problem may be in the lagged response to labour market changes, which is affected by labour market flexibility and is discussed in the Results section. Therefore, in relation to the middle-income class, it is necessary to explore a different selection of states, such as emerging economies, or to relate the given analysis to the regional level, where the given influences can be explored better and in more detail. Each of the EU countries is different, with different predispositions based on their institutions, customs and historical development. For example, the occupation of part of the EU by the USSR until the 1990s. Considering the other income classes, it may be useful to explore new current influences, especially those of the lower income class, such as energy poverty issues, 'greenflation', 'deglobalisation' and current societal crises and their economic and socio-demographic impacts, like the COVID-19 crisis or the conflict in Ukraine.

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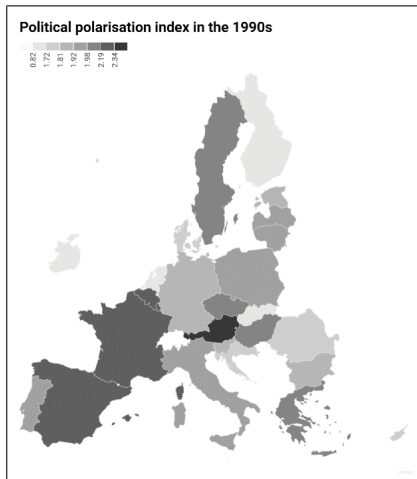
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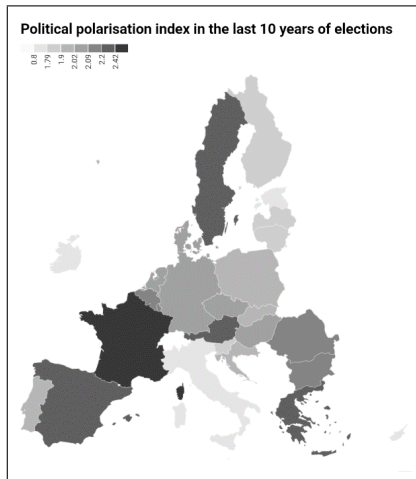
Appendix

Figure A1: Political polarisation index (dimensionless) in the EU in 1990s (10 years' average)



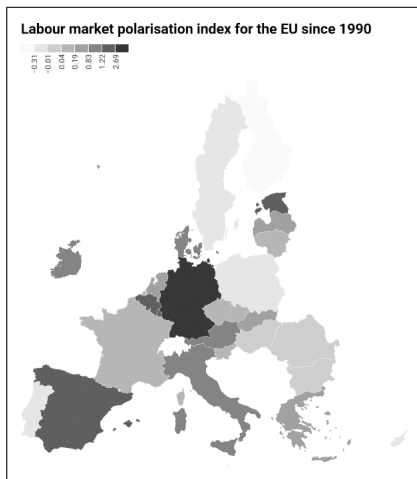
Data source: ParlGov (Döring and Manow, 2022); created in: Datawrapper.de

Figure A2: Political polarisation index (dimensionless) in the EU in the last 10 years of elections (average)



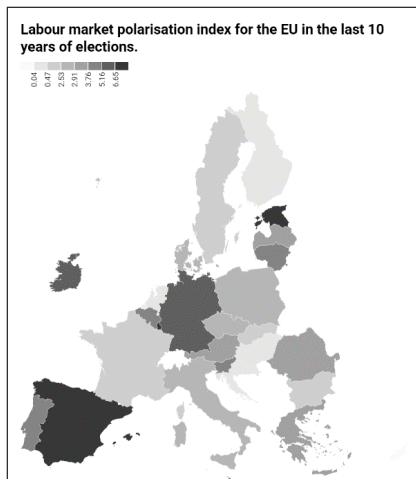
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Figure A3: Labour market polarisation index for the EU since 1990 (10 years' average)



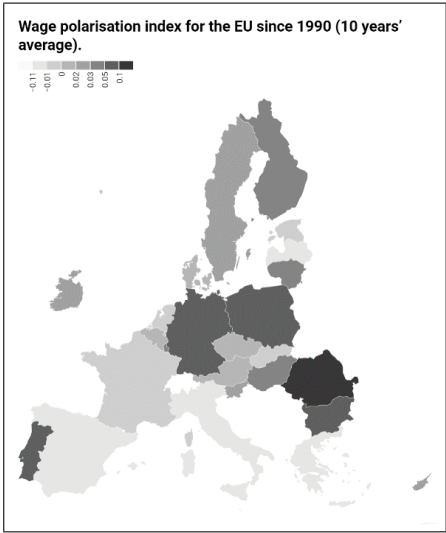
Data source: ILOSTAT (2022); created in: Datawrapper.de

Figure A4: Labour market polarisation index for the EU in the last 10 years of elections (average)



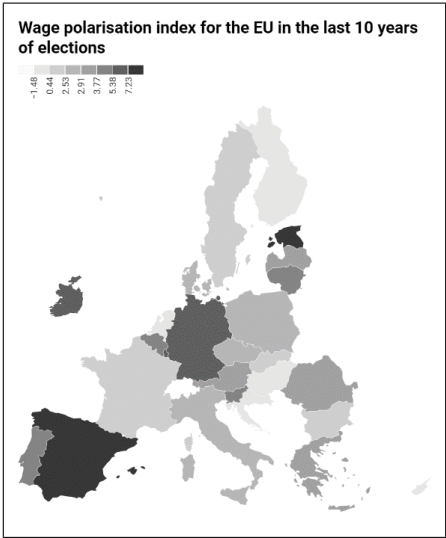
Data source: ILOSTAT (2022); created in: Datawrapper.de

Figure A5: Wage polarisation index for the EU since 1990 (10 years' average)



Data source: OECD (2022); created in: Datawrapper.de

Figure A6: Wage polarisation index for the EU in the last 10 years of elections (average)



Source of data: OECD (2022); created in: Datawrapper.de