

Inequality, Institutions and Macroeconomic Policies. Present and Future from Regional and EU-Wide Perspective

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Abstract

Premises The current geopolitical volatility in the immediate proximity of the European and, more specifically, EU-27 borders has brought to light wide incongruities with regard to policies, and the actual state of affairs regarding inequality at several levels. It is a question needing answers from both institutions (in wide understanding political, economic and social) and the macroeconomic policies applied. An increasing lag is identified between changes in the economic and social landscape. These changes are perceived differently by the wider public and some triggered waves of increasing discontent Europe-wide. The outcome is an unprecedented populist wave of various intensities in both old and new member states. The European Union construction is in itself an institutional innovation, and it is still undergoing development processes while attempting to manage a complex economic and social agenda on one hand, and meeting the demands of mitigating climate challenges on the other hand. The past two decades meant progress under increased pressures and risks as the shift from “one size fits all” to the “customized size” was associated to the creation of the new institutional assessment tool “European Semester”. The effects triggered by the 2020 pandemic and the outbreak of open conflicts in the immediate proximity contribute to heightening uncertainties and overall mistrust as potential ‘dormant’ issues can be identified on the labor market. The economic and social components of the European’s society canvas need fine tuning for preventing damaging economic and social effects based on the strength of relevant institutions.

Objectives Our analysis proposes a mixed-framework for analyzing the interplay between economic- and social-institutional factors influencing outcomes relevant for the European labor markets and societies and traditional macroeconomic indicators used to assess the competitiveness and performance level of member-states with particular emphasis on selected Central-and East-European Member-States (Romania, Poland, Czech Republic, Hungary) at regional level, and compared to a EU-27 wide perspective. **Methodology** Considering the availability of data, several dimensions were selected for analyzing the specific interaction between institutional, economic and social factors with impact on present and future developments determining the increase or decrease of inequalities from the perspective of education, labor market and digitalization. The analysis makes use of an econometric model and a rough DEMATEL method, based on z-scores

for identifying and highlighting relevant interactions between institutional-economic and social indicators and macroeconomic indicators underpinning how they influence either directly or indirectly outcomes of selected countries and of the EU. **Conclusions** The findings show that institutional factors need to be included in assessments, as they impact either directly or indirectly actual measurable macroeconomic indicators. Policies should be structured more targeted based on ex-ante evaluations of the conjugated impact of relevant factors. Of particular relevance is the interaction of the educational systems and their capacity to coordinate and collaborate with stakeholders from the public and private sector aiming to the creation of inclusive labor markets that are the core of reducing persistent inequalities at intra- and inter-regional level. Lack of assessing impact from the economic-and social-institutional perspective in an integrated institutional-macroeconomic framework might increase on short-, medium- and even long-term risks of polarization, social unrest and even create a favorable environment for open or covert economic and/or social conflicts.

Introduction

The years 2000s might be considered the most challenging period at global level, as they reflect how a short period of time might, and can encapsulate significant structural transformations of economies and societies, and how they are transitioning at unexpected speeds from post-industrial (Bell 1973) to digital and artificial intelligence defined economies and societies. These accelerated processes changing the physical world of industry. are shown by the fact that Industry 4.0 was coined only about a decade ago, when the German Government's project of equipping traditional manufacturing technology with high-tech solutions was labeled as such in the framework of the Hanover Industry Fair (2011). It took another four years before McKinsey Digital (2015) defined it as digitization of manufacturing, bringing with it a new production model, and the constant increase in the significance of the services' sector, together with the financialization of advanced economies, focused increasingly more on services' and transfers of production to other regions, in search of cheaper labor force, a process already started in the nineties in the context of the renewed globalization triggered by ICT developments.

If we were to document the first two decades of the 2000s, we might see that the year 2019 was the last one of a historical period, as the Covid-19 pandemic contributed to accelerated changes from political, economic and social perspective, and was the harbinger of a new period at world-, and European level. This short period (2000-2019) at history's scale showed that "the end of history" (Fukuyama 1994) was not even close, but that a new cycle is at its beginning: the cycle of digital economy and society in transition to the super-smart economy and society (Keidanren 2016).

The changes brought by the new and increasingly more sophisticated technologies to all economic sectors are accompanied implicitly by changes at the level of societies, and the cleavages in the interaction between economy and society became more obvious as, on the path to the super-smart economy and society, a wave of social discontent triggered by unfavorable economic shocks gave rise to populist movements, that gained even more weight in the post-pandemic context, when economic and social perceived inequalities and inequities, compounded by the political stances in pursuing development and safety considerations triggered the outbreak of various open conflicts as well (the war in Ukraine, and more recently the Middle East conflictual situation). The much debated about North-South, or East-West divide becomes even more obvious as political and

economic alliances shift, and become more relevant for global resources exploitation and use, for investment flows, trade, economic and social convergence.

Hence, the current context is characterized, by geoeconomic and geopolitical uncertainty and heightened volatility, changing the narratives for all economies regarding the public and private sector, and the societies as a whole. Now, we find ourselves in a period in which geopolitics and geoeconomics interact more than in the last half of the 20th century and the first two decades of the years 2000.

In this global context of changes, EU emerges as one of the actors that is faced with multiple challenges and crises, that could be absorbed under the term of “polycrises” from both geopolitical and geoeconomic perspective and impacting on how societies at EU level respond and react either in support, or in contesting policies, measures, actions and initiatives at EU and national level.

At the beginning of the years 2000s, it seemed that economy dominated at EU-27 level the majority of approaches dedicated to economic growth, convergence and cohesion, as the social component seemed to be pushed on a more or less secondary position. This perspective was revised and reviewed after the Great Recession, when the establishment of the European Pillar of Social Rights, and the monitorization of the social indicators became a sustained effort, albeit only as of 2017. It was the sign of a soft transition from economic growth “at any price” and from the “one size fits all”, to a more complex vision of development which took account about other components and factors that support economic growth by including also considerations about quality-of-life in general, individual wellbeing and social welfare, as technological progress hinted that recovery was not necessarily accompanied by employment increases, and the European middle-class, a backbone of economic, social and cultural progress was perceived as shrinking increasingly while polarization was on the rise. The root is inequality which is judged usually on two basic dimensions: economic and social.

While inequality has been analyzed consistently over various periods of time and continues to be assessed based on economic indicators related to GDP/capita, structure of economies, incomes and/or wages, or from a sociological perspective by referring to social structures, access to social services, it became obvious, already by the nineties and more so in the 2000s, that there is a strong link between how economic and social institutions operate and the generated economic and social outcomes.

The increasing stronger interest in the relevance of economic and social institutions was triggered by the accelerated and complex technological transformation that changed the economic and social landscape of an EU aiming to achieve a growth model beneficial for a competitive, sustainable and resilient economy, while providing also sound social policies aimed to ensure constant social progress.

The current state-of-play with respect to the digital economy and society shows that the inequality nexus in the present and in the future is conditioned by the increasingly more interspersed economic and social factors present in daily life activities, and constant interferences between the economic and social sphere.

These interactions and interferences are conditions by how economic institutions are operating, and the role they play next to macroeconomic policies in achieving a climate favorable to economic growth, social progress while, as numerous surveys show, the EU of today is faced with major challenges that threaten the ecosystems favorable to cooperation: the cost-of-living crisis; migration, and increasing divides within and in-between member-states on several levels, that reflect that inequality is not only an issue when related to income, but also to other relevant

aspects in a period in which theoretical knowledge and applied knowledge become a must on short- and medium-term.

The paper is structured in five sections: after the first section in which we present a EU-wide perspective related to inequality in the past two decades up to and including the years 2021/2022 by underpinning the relevant role played by institutions and macroeconomic policies from a digital- and knowledge-related perspective regarding inequality, the second section presents a brief literature overview, and the third section introduces the methodology for a perspective narrowed down to four countries of the region. The fourth section is dedicated to presenting the results and discussion. The final section outlines some preliminary conclusions.

1. State-of-play

The current period of economic, social and even cultural development at EU-27 level is characterized by numerous frictions, high volatility and uncertainty regarding state of the economy and society as a whole. The first two decades of the years 2000s, in a brief recap were marked by several crises of higher or lesser intensity: from tensions related to the accelerated pressures of technological advancements, to the ones of the financial crisis, an unprecedented migration wave, Brexit and, by the end of the second decade the outbreak of the Covid-19 pandemic which was, in our opinion, a turning point for perceptions of the wider public regarding individual wellbeing, social welfare, but also economic opportunities and challenges based on the flagship initiatives of the EU. The outbreak of the war in Ukraine (2022) only added to the European and global concerns, as it drew attention to the fact that not only geoeconomic conditions, but also geopolitical ones are more unstable, due to heightened competition which again displays the well-known features of the global North-South and/or East-West divide.

Three events stand out mostly in this context: the first occurred in the first decade and has been amply debated: the effects of the Great Recession on the EU-economies (2008-2012), which recovery reaching pre-recession levels for most of the EU member-states only after 2014.

The period 2015-2022, included in the present analysis was characterized by how economies recovered from the macroeconomic policies and business perspective. At macroeconomic level, the volatility increased regarding financial and prices' stability (main goals of ECB) while fiscal policies gained increasingly more weight at the level of member-states, economic growth was slow and accompanied by unemployment rates with varying degrees of fluctuation, and overall economic growth tended to be biased more towards services' sector, despite the ambitious relaunch of the EU industrial agenda (2020) after the revival initiated by the European Commission (2012) did not deliver, despite having as premise the fact that Europe for remaining competitive needs its own industry, hence drawing a map for reindustrializing Europe by increasing the share of industry in GDP from 16% to 20% by 2020. However, this initiative was somewhat stymied by the pressure of aiming towards climate neutrality, in particular post the adoption of the Green Deal (2019), which proposed a "new growth strategy" having at core the idea of joining and meeting both green and digital transition while attempting to diminish geopolitical dependencies (European Commission 2019).

These objectives of macroeconomic policies in terms of fiscal and financial stability, economic growth, and unemployment diminishment were accompanied by considerable changes in the businesses' ecosystems due to higher rates of digitalization after the Great Recession. A renewed acceleration of the transformative processes introducing wide-scale digitalization occurred in the context of the Covid-19 pandemic which altered at least some of the rules of the game in the public and private sector (Tirca et al. 2021).

At the same time, at macroeconomic level it triggered a revision and update of the European Industrial Strategy by emphasizing again that EU's dependencies on global partners, from which some were already identified as 'systemic rivals', for instance China (EC 2019), needed strong monitoring and focus on strengthening the sustainability and resilience of each member-state and of the EU as a whole by improving the "open strategic autonomy" in an all-encompassing framework with economic, social and environmental concerns (EC 2021). Obviously, the war outbreak in the Ukraine, the energy crisis triggered by this shock reflecting an emergent not only geoeconomic but also geopolitical decoupling has made the strategic autonomy of Europe a core issue of economic and social debates at EU-27 level, which were amplified by the inflationist processes and increases in the cost-of-living.

This macroeconomic framework needs to take into account the developments in the private sector, where tertiarization became the main generator of economic growth and added value. This, based on the intensive digitalization of all economic sector is indicative for a significant structural change with economic and economic-institutional implications: considerable changes occurred in the makeup of economic assets which no longer are only tangible, but increasingly more intangible and relevant in a heightened competitive environment with geoeconomic and geopolitical risks and opportunities. Amongst the most relevant intangibles identified are design, brands, patents, organizational capital, training, some new financial services, instruments, etc. In this context, we suggest that the social and intellectual capital of the member-states and of the EU-27 should also be considered as valuable intangible assets, that could be monitored based on indicators such as the capacity to attract and retain talent, capacity of making use of high-tech by bringing together theoretical and applied knowledge in business ecosystems that succeed in integrating education, training-retraining, implicitly skilling, reskilling and upskilling, with economic activities generating profits. More briefly expressed as capacity to build development clusters for economic activities corresponding to the digital economy (see the Institutional Profiles Database, CEPPII), the capacity to develop long-term cooperation between the academic/university environment and business environment, etc.

Actually, all complex developments show that in the current stage of EU-27 development in a context fraught with high volatility and uncertainty that give rise to discontent and mistrust at the level of the entire EU population, all macroeconomic analyses should be performed by including also assessments regarding some of the relevant economic-institutional indicators, as economic complexity is accompanied by structural changes of the labor market, and failure to take into account its institutions might trigger unwanted effects due to external shocks like unexpected high migration waves (see the effects of the 2015 migration wave), or of pandemic outbreaks, or even due to the quick advances of the communication and information technologies, heightened digitalization and AI intervention in relevant public and private sectors of the economy.

All these elements show that EU-27 is now in the stage of a post-industrial economy and society transitioning fast towards a completely digitalized economy which opens the path for the super-smart economy and society. This gives rise to questions related to how adapted are current labor market institutions to the new challenges and risks. The role of the labor market institutions¹ needs to be investigated as they play a significant role in guiding towards the efficient use of human resources, and in supporting sustainable economic development, as markets cannot generate economic or technological dynamism in the absence of the essential institutions able to organize and coordinate the actions of economic agents. Economic and social institution have several roles to satisfy: protecting human capital from external shocks generated by changes in volume and

¹ Economic and social institutions are referred to based on the theories of New Institutional Economics.

structure of labor demand, assisting in facilitating and improving professional and social upwards mobility, providing frameworks for learning new skills or updating skills, providing the right premises for equitable distribution of incomes between workers, managers, professionals, investors and public authorities (Pavelescu 2009).

This nexus of macroeconomic policy – which depends vastly from one member-state to another on how the economic-social institutional framework is built – and institutions is one that must be taken into account when analyzing inequality at EU-27 level, as the sources of inequality have diversified at multiple levels, and is no longer only a question of income polarization, but also of access to, knowledge about, and use of the mechanisms and instruments provided by the digital economy.

1.1.Key-sources of EU-27 and regional inequality

In order to identify main sources, and whether they impact differently at the level of New Member-States, we opted for four member-states that share some geographic and historical similarities, respectively Romania, Hungary, Poland and Czechia. Out of them, three are also in the immediate proximity of the conflict in Ukraine, as they share a border with this country, and all four have had a more or less intricate relationships and dependencies on Russian energy resources that are now subjected to sanctions.

The basic perception at the level of the EU-27 population is that inequality has increased, mainly as regards incomes. However, if we compare for the EU-27, and for the selected New Member-States from the central European region (Romania, Poland, Czechia and Hungary) we find that post-crisis, during and after the Covid-19 pandemic and in the year of the outbreak of war in Ukraine the income inequality tended to be higher for the NMS, in particular as regards Romania (Figure 1).

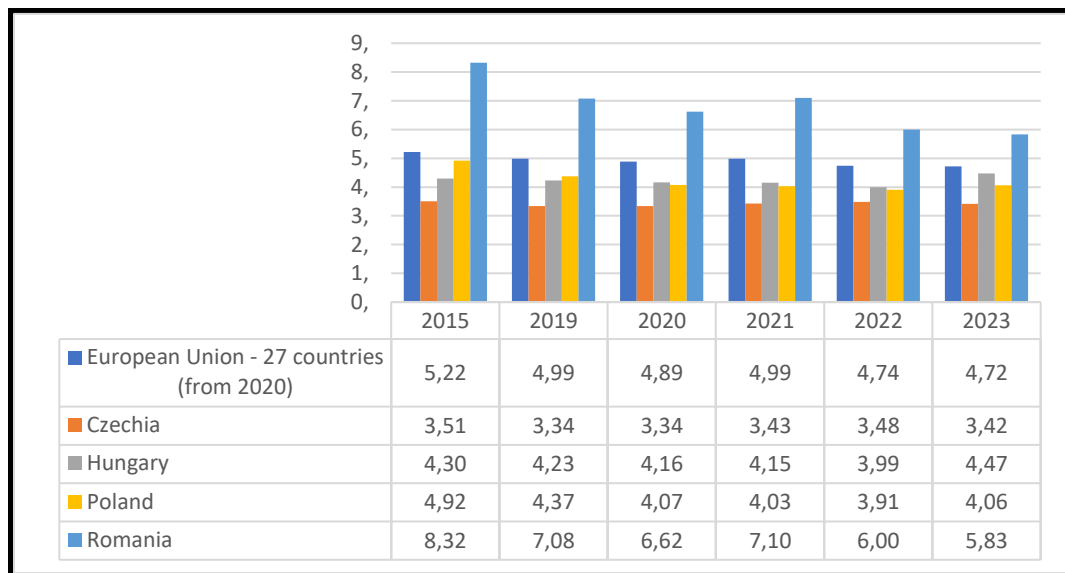


Figure 1: Total income quintile share ratio between S20/S80 in EU-27, and selected New Member-States over the period 2015-2023

Source: Eurostat Database, [ilc_di11]

In the period 2015-2019 the overall trend is of decrease regarding the income quintile share ratio per total, including Romania. However, post-2019 we notice that the fluctuations are much higher with increases and decreases, signaling the volatilities triggered by the pandemic, out of

which many were triggered by the digital transformation of work which gained speed in the period 2020-2021. This trend is not completely followed by Romania, where the discrepancy is much higher overall in total population.

The situation is somewhat similar, if we consider the income quintile share ratio of disposable income S80/S20 for those considered able and willing to develop income generating economic activities, which reflects a certain degree of convergence at EU-27 level, but high divergence in the evolution between the Poland, Hungary and Czechia against Romania (Figure 2). In search of possible causes, we find that one issue differentiating Romania from the other NMS is that within country regional differences play a major role, as there is still a considerable gap between the most developed regions of development and the less developed ones. This is, the high urbanized areas of the Bucharest-Ilfov region, West and Centre, outpace the other regions of the country respectively, North-East, North-West, South-East, South-Muntenia, and South-West Oltenia.

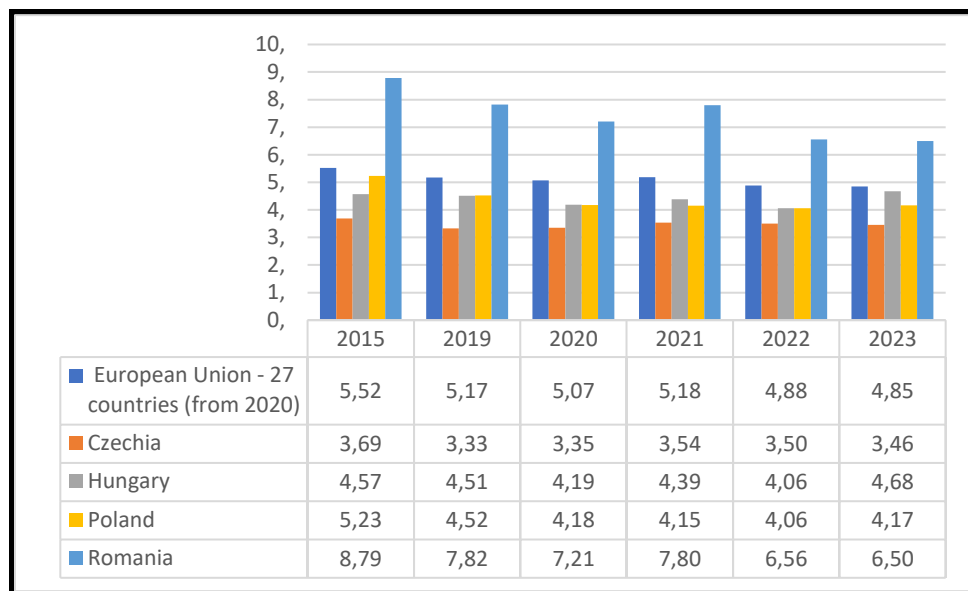


Figure 2: Total income quintile share ratio between S20/S80 in EU-27, and selected New Member-States for individuals less than 65 over the period 2015-2023

Source: Eurostat Database, [ilc_di11]

However, the situation is worse in the case of elderly, where both economic and social institutions failed to prevent the increasing income disparities (Figure 3) at a more considerable pace, despite governmental policy efforts to correct this path. It should be mentioned that currently measures have been taken for recalculating pensions and other social benefits for individuals over 65, which are to be implemented as of September. This, in the context in which, the perception of the population is that the cost-of-living is on increase especially for food products and energy supply² (gas and electricity) put in question the outcomes of this initiative, as the war in Ukraine continues and endangers supplies for gas and oil, including here the sanctions for the Russian state, and the country was faced with severe drought due to climate change and unprecedented high temperatures in the current year. This makes the elderly one of the most vulnerable groups in

² Recent estimates foresee new price increases for food and energy in this autumn due to the impact of the draught and the volatility registered on the market for energy.

Romania, with reduced access to some of the services and activities aimed at improving quality of life.

If we compare the income differences between individuals that are still active and have not reached the age of 65, and those aged 65 and over, we find that the group most exposed is the one of those who are still active in the labor market. At the same time, these developments show that, from a historical perspective, the answer of the EU-27 was much more coordinated during the pandemic and after, even if we factor in the impact of the war in Ukraine for the three of the member-states included in our analysis (Hungary, Romania and Poland) sharing the border with Ukraine.

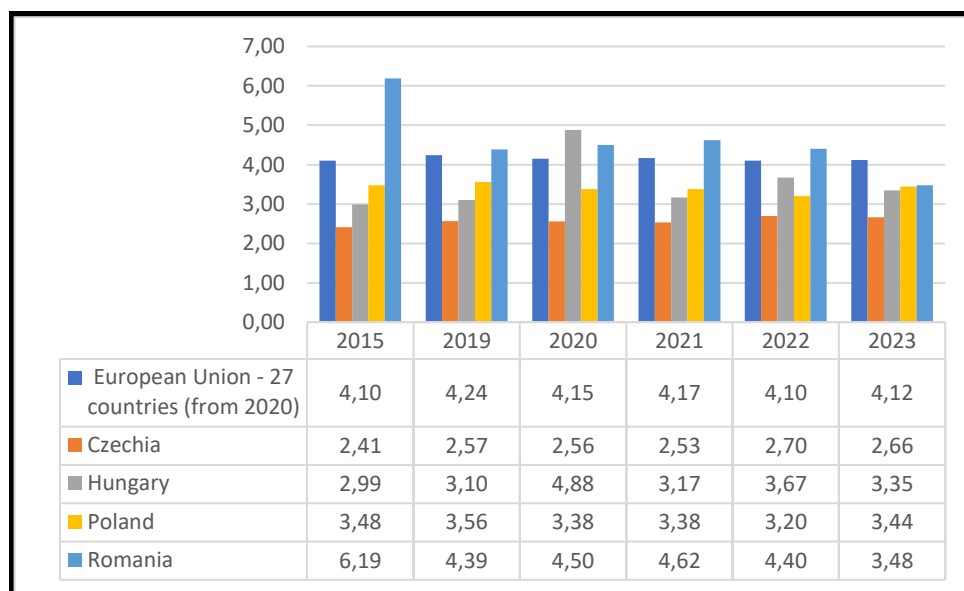


Figure 2: Total income quintile share ratio between S20/S80 in EU-27, and selected New Member-States for individuals over 65 years in the period 2015-2023

Source: Eurostat Database, [ilc_di11]

Nevertheless, if we consider the EU-wide perspective, the process of convergence has continued and income inequality as such is on a declining path because of income convergence, as shown by a recent Eurofound report (2024). If we take as measure in this respect the unweighted Gini coefficient and the unemployment rate over the period 2015-2022 for EU-27 and the selected member states, we find that this decreasing trend is confirmed, albeit Romania shows a higher degree of divergence in closing the gap.

The Gini coefficient of equivalized disposable income was rather comparable for the Poland, Romania all showing higher and persistent disparities, while they were less significant for Czechia and Hungary. However, post-pandemic, the discrepancies decreased for Poland, Romania and the EU-27, while they increased in Hungary, and remained constant in Czechia.

Table 1 Gini coefficient of equivalized disposable income and unemployment rate for population in labor force over the period 2015-2023

Gini Coefficient	2015	2016	2017	2018	2019	2020	2021	2022	2023
EU-27(2020)	30.8	30.6	30.3	30.4	30.2	30.0	30.2	29.6	29.6
Czechia	25.0	25.1	24.5	24.0	24.0	24.2	24.8	24.8	24.4

Hungary	28.2	28.2	28.1	28.7	28.0	28.0	27.6	27.4	29.0
Poland	30.6	29.8	29.2	27.8	28.5	27.2	26.8	26.3	27.0
Romania	37.4	34.7	33.1	35.1	34.8	33.8	34.3	32.0	31.0
Unemployment Rate									
EU-27(2020)	10.2	9.3	8.3	7.4	6.8	7.2	7.1	6.2	6.1
Czechia	5.1	4.0	2.9	2.2	2.0	2.6	2.8	2.2	2.6
Hungary	6.6	5.0	4.0	3.6	3.3	4.1	4.1	3.6	4.1
Poland	7.7	6.3	5.0	3.9	3.3	3.2	3.4	2.9	2.8
Romania	8.4	7.2	6.1	5.3	4.9	6.1	5.6	5.6	5.6

Source: Eurostat database, [tessi199] and [tps 00203_custom_12589338]

If we analyze the evolution of the unemployment rate in total population in labor force over the same period, we find that the lowest fluctuations were recorded in Czechia, while all other NMS, and the EU-27 showed higher variations over the period, and maintaining somewhat more constant rate only in the period 2022-2023 (Table 1). Another key factor triggering inequality is the supply and demand of skilled labor which is reflected by the vacancies and the structure of the demand for jobs in certain economic activities of both public and private sector. In this case, inequality is defined by level of education and/or vocational-educational and training for complying with the demands in certain specific jobs, like the ones in healthcare, including (specialized) long-term care for elderly, or in the Horeca industry. These are also the most demanding jobs, still requiring physical implication and thus they tend to also be in the lower half of the income pyramid, even though the focus of latest policies were for increasing the incomes for the lower half of the working population (Eurofound 2024).

In the post-pandemic period, it was noticed that for improving competitiveness, generating a new pool of innovation and research-development in agreement with the objectives of a Green Deal that should be reconsidered and recalibrated in accordance with the new geopolitical and geoeconomic imperatives, and in the context of the cost-of-living crisis that has varying degrees of intensity in both EU and non-EU countries, we should start from the premises that: a) the inflationary pressure is a discriminating factor between the various socio-economic categories; b) the economic and social vulnerabilities identified during the pandemic period have not been attenuated, and in some cases they even show an increasing trend, given the polarization – despite overall EU-27 convergence – and the added pressure generated by the demographic change, that is another contentious issue, based on the increasing perception of migration as not a desirable thing. Here, we amend that this is also an issue that should take into account how economic and social institutions (religion, beliefs, customs) and cultural ones interact, as to achieve more balance.

Finally, the Green Deal will need a relaunch on adjusted bases, just like the ‘autonomy strategy’ from industrial perspective of the EU, as the reality has shown, especially beginning with 2022 and up to present that the safeguards for transitioning swiftly to a decarbonized economy are not in place, and this brings with it more threats on a transformative labor market.

This is also why we argue that macroeconomic policies and empirical analyses regarding the state-of-play of EU-27 economies should focus more also on the economic-social indicators, as they contain a wealth of information regarding various necessary capacities with respect to labor and capital, but also regarding intangible assets and heightened capacities of cluster building and cooperation between the most relevant ecosystems representative for businesses and education systems in a new developmental stage such as the digital economy.

1.2. Economic and social institutional indicators addressing inequality

Inequality is one of the cornerstones in defining what we expect and how we project the evolution of the European welfare state now and in the future. While reflected from the economic perspective in differences regarding incomes, or in how inflation pressures affect individuals and businesses within the EU-27, major impacts were also perceived at the level of economic and social institutions that had to generate in short-term mechanisms to mitigate the combined effects of the post-Covid-19 recovery period, and of the outbreak of the war in Ukraine.

According to the agreed-on framework proposed for institutional economics analyses, economic and social institutions as they are at any given time are the result of a mixture of endogenous and exogenous processes requiring longer or shorter periods of time (Williamson 2000; Voigt 2013) as first rank institutions are the ones developing endogenously and consist of customs, traditions, culture and religion. While they are relevant for the social structure of a society, we might safely say that customs are exogenous for the economic system, and that these first rank institutions do not have relevance for the purposes of the present analysis. However, the Northian 'rules of the game' which require time horizons varying between 10 and 100 years are relevant for the current and future evolutions of the legislative-institutional framework of the EU, and of each of the member-states. Even more important, for the current period than the 'rules of the game' is how the game is played, that is the current practices of governance which require average periods of time to become practice, respectively 1 to 10 years, and finally, the allocation of resources where also employment is included, actually the mechanisms that are employed from capital movement, trade, employment to the social insurance systems. It is a formal system, while how the game is played and the rules of the game have both formal and informal components.

The European Union is in itself an unprecedented economic, social and political institutional project, and we consider that it is still in the process of developing its mechanisms, tools and models of good governance, in an extremely difficult period of transitioning from the post-industrial to the super-smart economy and society. As such, its approaches and considerations should focus on the quality of governance, with particular emphasis on the economic and social institutions of the labor market, as this market has particularities that make it the most difficult market to manage in a consistent manner to the satisfaction of all stakeholders involved or interested in it.

One question that is still to be answered is what economic and social institutions are developed and need improvement in the digitalized economy, followed by the question about which new economic and social institutions should be created in the new environment generated by the increasingly stronger combination of interaction between humans and digital robotized and automated environments, and as AI gains momentum and is even reality in certain industries and services, including tourism.

North (1991) suggested that institutions in economics are the rules and norms either formal or informal according to which economies function, while Acemoglu and Robinson (2005) refine this approach, by maintaining that economic institutions are accountable for incentives and resources' distribution within societies, thereby regulating and defining the type of power exercised within societies. These economic and social institutions are the ones affecting individual and collective choices (Acemoglu et al 2006). This perspective is relevant for economic institutions in general, and in particular for institutions of the labor market, as these economic institutions have also a strong social component based on the impact and effects they trigger. It is a reinforcement of the idea that by only analyzing the general economic framework determining

or hampering economic growth, and ignoring institutions is somewhat debatable, as these institutions, either economic, social or even political are the ones characterizing and determining the attractiveness or lack thereof for economies (Acemoglu et al. 2002; Easterly et al. 2003; Dollar et al. 2003; Glaeser et al. 2004).

For the purposes of the present paper, we define the labor market as a complex framework-institution encompassing both economic and social institutions the performance of which impacts countries with respect to economic, social, cultural and even political performance.

The most relevant institutions in the labor market including from both economic and social perspective are the ones concerned with employment protection legislation, wage setting, labor taxation, unemployment benefits, working time, mobility, active labor market policies. All these institutions are in strong interdependency relationships, and considering continued sensitive changes in the productive processes, the expansion of information technologies draw attention to the need of (re)thinking how their mechanisms work in order to facilitate individual wellbeing and social welfare (Pavelescu 2009).

According to the latest available data from the LABREF database, it might be seen that most major labor reforms were related to active labor market policies related to public employment services for job assistance, job counselling and seeking, direct job creation schemes, and employment subsidies. In the field of wage setting, most measures for all four New Member-States (Romania, Poland, Hungary and Czechia) were setting the framework for public wages, and governmental regulations for the wage bargaining framework, including here the statutory minima, while labor taxation concerns were related to social security contributions for employers and employees, working time for assisting families and organizing family-related working time, including the management of working hours. Another issue, is the employment protection legislation (EPL) that needed adjustments for the maximum duration of fixed-term contracts, but also for maximum number of renewing such fixed-term contracts, for temporary agency work, etc. Most of these interventions are indicative for the uncertainty in a changing labor market, requiring improved functioning of economic and social institutions in the labor market, but which also might gain overreaching features.

If we refer to the complex nexus required by the digital economy, respectively the interaction between theoretical and practical knowledge that more often than not are present in the digital economy simultaneously, than there are some economic-social institutions that characterize at granular level the potential of each of the member-states included in the present analysis, but also for the other developed member-states and former member-states of convergence and cohesion, if we consider the whole EU. Such institutions are those related to the institutional quality of governance with respect to vision on medium- and long-term, capacity of implementing policies and strategies, capacity of encouraging development of clusters that are unique ecosystems of businesses, research-development and innovation and universities or other educational organizations, as well as the capacity of supporting public-private cooperation by employing the devices of new and more flexible ways of ensuring cooperation and coordination for ensuring economic growth, diminishing inequalities and creating premises for sustainability, resilience and inclusion. At the same time, their cornerstone is trust, respectively trust in official economic and social communication, which assists in managing potential predictable or unpredictable external shocks, for instance pandemics, the outbreak of wars in the immediate European proximity, or migration waves like the one of 2015. All these are tools for attenuating wrong perceptions, that might encourage actions with further conflictual potential, as shown by the increase in populist movements that intensified over the last 10 years.

2. Literature review

The digital economy has emerged in a context of high economic and social uncertainty and volatility, accelerating during and in the aftermath of the Covid-19 pandemic. The period, has shown that there are potential substantial economic gains from fostering ecosystems that make use of digital technologies. Nevertheless, despite the convergence of incomes, within the EU-27, income and wealth inequalities continue to increase and one of the sources is how digitalization impacts markets: from the market for goods and services to labor market. Here we see that the distribution of capital and labor income is more skewed, as businesses have looked to maximize profits to the detriment of labor, with the increasing polarization becoming more noticeable for both high- and low-wage workers (Acemoglu et al. 2011). One of the risks perceived by individuals, but especially by those in the labor market is the one of being replaced by automation, including the emerging AI applications (Brynjolfsson et al. 2019; Pratt 2015). The outcome of these concerns would be the technological unemployment (Mokyr et al. 2015), together with an even more marked shrinking of the middle-class. However, one of the questions relevant in the context, is not the degree of automation in any given economy, but how profitable is to adopt such technological capabilities over a short-period of time, i.e. which is the optimum speed of diffusion (Acemoglu et al. 2018). Among others, this speed of diffusion is depending on other factors as well, from the process of organizational redesign for increasing quality of goods and services by obtaining also efficiency gains (Bresnaban et al. 2002). Moreover, another significant factor is that investments' capacity might be a hindrance in implementing new technologies (Arntz et al. 2018), while institutional-legislative frameworks and ethical reasons might also factor in when analysing the speed of technological adoption (Thierer et al. 2015; Bonnefon et al. 2016).

Precisely these types of concerns and debates bring to the forefront the relevance of economic and social institutions, and for the European Union, the question about their quality, that is in a context in which, the specialized literature, but also statistical data show that, if we leave aside the Worldwide Governance Indicators, which measure 4 dimensions (Voice and Accountability), Political Stability, Regulatory quality, and Rule of Law and Control of Corruption) has much less to show on measuring and monitoring consistently economic indicators and social indicators that are relevant for both economic and social outcomes. One initiative worth mentioning, is the Institutional Profiles Database which has a more granular approach capturing dimensions related to political institutions, financial institutions, property rights, administrative capacity, labor market and social upwards mobility, etc. However, the latest release is from 2016, and in our opinion, at least some of the indicators have been subjected to changes to a higher or lesser degree, especially post-2020. Nonetheless, the Eurofound report of 2022 identifies that there is much more divergence than convergence with respect to institutional quality between the member-states, with Nordic and western European countries among the best performers, while the situation is more complex, for central European member-states. At the same time it shows that there is a positive link between employment rate and institutional quality, and a negative relationship between WGIs and risk of poverty and social exclusion. In a succinct understanding, the findings of the mentioned study show that the higher the institutional quality, the higher is the employment rate and the lower the risk of risk of poverty, social exclusion, and by inference this triggers also considerable decreases in inequality.

3. Methodology

In the state-of-play we focused on some of the sources of inequality, mainly those related to the income gaps that are increasing, despite converging at EU-wide, in a context marked by inflation, and cost-of-living crisis. However, there are a multitude of factors determining the income inequalities and they are circumscribed not only to the quality and the functioning of the labor market institutions, but also to how macroeconomic policies are designed and implemented.

Moreover, if we begin with the premise that macroeconomic policies are built based on institutional mechanisms, including here those related to social institutions, at the most basic level of the institutional pyramid, respectively the level of resources allocation, we identify the impact of resources allotted for education and vocational training and education. Indeed, their effects show a time lag and cannot be immediately measured, but their relevance is captured over the medium-to long-time horizon, and might contribute to understanding progresses registered especially in the new context generated by the digital economy EU-wide and at regional level.

Therefore, for capturing the effect of the education systems' development and of the increased role played by the activities related to information-communication technologies in labor force employment and in the income disparities in the central-European member-states analyzed in the present paper, we propose the use of the following econometric model:

$$\text{CEDI} = a + b * wEdGDP(-1) + c * wICTE(-2) + \sum \text{Dummy}_i \quad (1)$$

Where:

- GCEDI = Gini coefficient of equalised disposable income.
- wEdGDP (-1) = ponderea cheltuielilor totale pentru educație în gross domestic product, din anul precedent celui analizat share of total expenditures for education in gross domestic product for the year preceeding the year of analysis
- wICTE (-2) = share of activities related to information-communication technologies in total employed population with a 2-years lag against the year of analysis
- Dummy = variables identifying the particularities of one country in relation to the country considered as benchmark

The construction of the econometric model considered both the available statistical data, as well as underpinning the particularities of each of the countries taken into account within the group in relation to the country regarded as benchmark. The signs of the parameters may be both positive and negative.

In a second stage, we developed a rough Dematel-model constructed on the basis of the z-scores for energy transition and green transition, interpreted in average under the heading 'twin transition' and digital technology expansion for regarding economic indicators, for social indicators we selected the z-score of access to education and inequality of income distribution, and as institutional indicators we selected trust (the cornerstone) in official economic-social communication, and the regulatory-legislative quality. For geopolitical risk indicators³ we included the z-scores for cyber-attacks and contiguity with a conflict area. In order to realize the DEMATEL-analysis we first made a linguistic interpretation, as suggested in a comparable analysis (Zhu et al. 2021) for the transformation of the z-scores for use on the Gabus-Fontel scale (Table 2). Next, we constructed a 6 by 6 direct relationships matrix, after attributing the values on the Gabel-Fontel scale. The DEMATEL-method was applied for the same member-states used in the econometric model (Poland, Czechia, Hungary and Romania). The method allows in this manner for improved visualization of the significance and relationships between the economic,

³ Based on GPR (Geopolitical Risk) Index, available at <https://www.matteoiacoviello.com/gpr.htm>

social, institutional and geopolitical indicators in this period which might be regarded as a period of heightened transformative impacts due to the volatile geopolitical and geoeconomic context, which act as triggers for various social movements expressing the unrest of the populations, not only at European but also at global level.

Table 2. Linguistic variables for z-scores attribution on Gabus-Fontel scale

Linguistic variable	z-scores	Gabus-Fontel scale
Very Low	0	0 = no influence
Low Influence	0.1-0.3	1 = Low influence
Medium influence	0.4-0.6	2 = medium influence
High	0.6-0.9	3 = high influence
Very high	0.9 – 1.0+ and over	4 = high impact

Source: Authors' own concept

The z-scores, interpreted linguistically were then included in a direct relationships matrix, with the following values on the Gabus-Fontel scale:

Table 3. Direct relationships matrix

	Twin transition	Digital technology expansion	Access to education	Inequality in income distribution	Trust in official economic-social communication	Regulatory-legislative Quality	Cyber-attacks	Contiguity with a conflict area
Twin transition	0	1	3	4	4	2	1	2
Digital technology expansion	3	0	4	3	2	3	4	1
Access to education	4	4	0	3	2	3	1	1
Inequality in income distribution	4	2	4	0	3	2	1	1
Trust in official economic-social communication	4	1	3	2	0	3	3	4
Regulatory-legislative Quality	4	2	3	4	3	0	2	4
Cyber-attacks	1	4	4	1	2	3	0	1
Contiguity with a conflict area	1	2	1	2	4	4	4	0

Source: Authors' own concept, based on processed data from WGI, Eurostat, WEF Competitiveness Index and the Geopolitical Risk Index (GPR).

A caveat is necessary: the values included in the direct relationships' matrix is the outcome of a quasi-survey between the authors of the present paper, who were asked to attribute their own values for each indicator in accordance with the Gabus-Fontel linguistic transformation of the z-scores, and the outcome of rounding the obtained averages for each indicator based on the assessment of each of the authors.

After this first step, the second step was normalizing the 8 by 8 matrix based on the following equation:

$$X' = \lambda * T \quad (2)$$

Where: $\lambda = 1/\text{divided by the highest value of summing up each row } X$;

and X' = normalised matrix of direct relationships for the considered four member-states.

The results were transformed to build the final total influence matrix relevant for all selected countries, and to determine which of the factors are most relevant in the current context.

The matrix of total influence was calculated as follows:

$$T = X' * (I - X')^{-1} \quad (3)$$

T represents the total influence/impact matrix, X' is the standardized matrix of direct relationships, and I is the unitary matrix. The element x_{ij} of the matrix T represents the direct or indirect influence/impact of the indicator i on the indicator j.

Next, the significance and relationship indicators were calculated according to the following formulas:

a) The significance indicator:

$$S_i = \sum_{j=1}^n t_{ij} + \sum_{j=1}^n t_{ji} \quad (4)$$

b) The relationship indicator

$$R_i = \sum_{j=1}^n t_{ij} - \sum_{j=1}^n t_{ji} \quad (5)$$

The results, included into a cause-effect map of significance and relevance delivers information for understanding the wider context that should be taken into account in periods of volatility, at the level of some member-states, and represent a first stage before extending the model EU-wide, considering the current challenges regarding the demands imposed by the twin-transition, when inequality and the deficiencies identified regarding institutional quality, in the EU, but also in the case of the analyzed central European countries might increase overall volatility for the region, but with effects that might be felt also at EU-27 level.

4. Results and discussion

As mentioned above, in the case of the econometric model were included four central-European countries, respectively Czechia, Hungary, Poland and Romania. For the model, Eurostat data were used over a period of 10 years, respectively: 2014-2023 for GCEDI, 2013-2022 for wEdGDP and 2012-2021 for wICTE.

It is obvious that between the four countries a series of differences show regarding the average of the indicators considered. Thus, the highest disparity in equalized disposable income is noticed for Romania, and the lowest for Czechia, with a Gini coefficient of 34.12%, and 24.59% (Table 4).

Table 4. The average values of the GCEDI, wEdGDP and wICTE(%)

Indicator	GCEDI (2014-2023)	wEdGDP (2013-2022)	wICTE (2012-2021)
Czechia	24.59	4.6	3.04
Hungary	28.18	4.98	3.60
Poland	28.40	5.05	2.36
Romania	34.12	3.20	2.32
Average	28.82	4.46	2.83

Source: authors' own calculations after Eurostat Database

The highest weights of the expenditures with education in gross domestic product of about 5% were registered for Poland and Hungary, while the weight of information-communication technologies activities in total employed population was around 2.3% in Romania and Poland, and over 3% for Czechia and Hungary.

Under these circumstances, by the OLS method were estimated the following parameters and statistical tests for the econometric model

$$GCEDI = a + b * wEdGDP(-1) + c * wICTE(-2) + \sum \text{Dummy } i,$$

for which the results are presented hereunder:

Table 5 Summary of the estimated results of econometric model

Indicator name	Indicator size	Student test statistic
a	38.0733	22.9010
b	0.9594	2.0751
c	3.0313	-7.2879
DummyCze	-8.6725	-11.3783
DummyHun	-3.7526	3.8257
DummyPol	-7.3525	-7.9509
R ²	0.9583	
R ² adj	0.9522	
D-U	2.0183	

Source: authors' own calculations

Note: DummyCze = dummy variable for Czechia, DummyHun = dummy variable for Hungary, DummyPol = dummy variable for Poland

R² = coefficient of determination, R²adj = adjusted coefficient of determination

D-U = statistics of Durbin - Watson test.

The estimated parameters highlight, at first view, that at the level of the countries included in the model, the relative increase in the expenditures allocated to the education system and for vocational education and training leads, on long-term, to a differentiation of incomes. In turn, the growing role of information-communication technologies contributes to decreasing income disparities due to the fact that the higher number of jobs in the respective activities has as effect the increase in the wage-level for a constantly wider category of employees who had initially lower wages.

Moreover, it is noticed that all coefficients estimated for the dummy variables are negative, a fact that ascertains again the significantly higher disparities of disposable incomes for the country

considered as benchmark (Romania), in relation to the other three member-states of the European Union included in the model.

It shouldn't be ignored that the statistical test indicates a good quality of parameters' estimation. Thus, the statistics of the Student test is consistently higher than 2.0, meaning that the probability of the null hypothesis is less than 5% for all estimated parameters. At the same time, the adjusted coefficient of determination is higher than 95%, and the statistics of Durbin-Watson is very close to 2.0, suggesting an extremely low correlation of errors.

Hence, it might be concluded that the differentiation of disposable incomes between the four central European countries was correlated to a large extent with the implementation of the new technologies, but also with the allocation of the financial resources required for the development of the education and vocational education and training system.

The use of the DEMATEL method highlighted some important facts about the significance of the considered indicators and the relationships they have in the wider, complex economic, social and political context.

By applying the required steps, the following results were obtained for the significance and the relationship indicators (Table 6).

	Relationship $R_i = \sum_{j=1}^n t_{ij} - \sum_{j=1}^n t_{ji}$	Significance $S_i = \sum_{j=1}^n t_{ij} + \sum_{j=1}^n t_{ji}$
Twin transition	-2.5628	5.5218
Digital technology expansion	0.6793	7.0671
Access to education	-0.4663	7.3981
Inequality in income distribution	-0.0462	6.617
Trust in official economic and social information	0.5521	7.5537
Quality of regulatory-legislative framework	0.5955	7.7421
Cyber attacks	0.2836	6.429
Contiguity with a conflict area	0.9648	6.3108

For better visualizing these outcomes, and for understanding cause-effect, and influence-impact significance and relationships, the relationship diagram is one of the best means, of analyzing the outcomes. In our model, on the vertical axis is reflected the relationship, while the horizontal axis shows the significance. The values of negative sign are effects, while those with positive sign are causes. Hence, we see that access to education, for instance is strongly influenced by all other criteria, while the highest influence is exerted, in this instance by the institutional indicator related to trust in official economic and social information, which governs the significance and relationships for all other indicators. While cyber-attacks and contiguity with a conflict are show high significance, their relationship with the other calculated indicators is rather low, meaning that in wider perspective, more accent should be laid on improving economic and social indicators from the perspective of the economic and social institutions governing them, as

they generate negative effects also for the inequality in income distribution based on their significance and relationships (Figure 3).

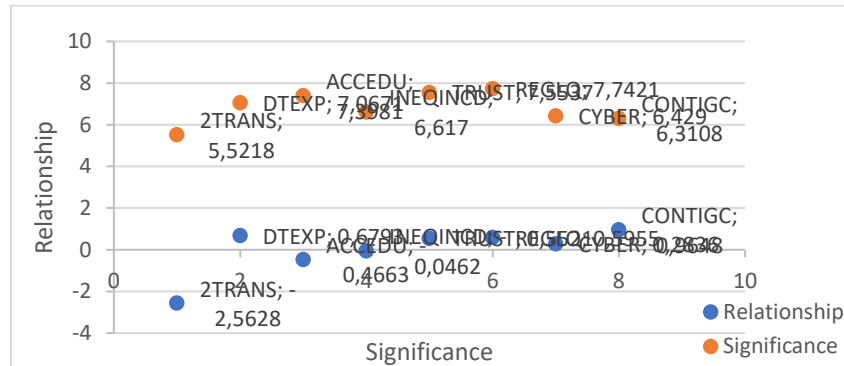


Figure 3: The diagram of relationships and significance between the selected indicators.

Source: authors' own calculations

One significant mention, is that as regards the twin transition, this should be regarded as an effect, but significantly influenced by the circumstances in which it occurs. Hence, both macroeconomic policies and institutional development policies and measures should be implemented based on ex-ante evaluations of their impact and influence for the effects they might generate for twin transition, access to education and training, and for managing and closing income inequality disparities.

5. Conclusions

The period analyzed in the present paper covers the more or less the ten years, after the European Union exited the crisis, up to the present when the levels of uncertainty and volatility are on increase. It should not be omitted that by the time of the outbreak of the Covid-19 pandemic, a new external shock after a relatively short period of economic recovery, the post-crisis effects were still lingering, and the EU was in an intense process of reviewing its policies with respect to the industrial sector. Covid-19, and the war in Ukraine did not slow down the convergence processes at EU level on the four specific dimensions (economic, social, institutional and environmental). However, inside the convergence processes there were detected some divergence trends, in particular for some of the central European countries all related to increasing inequality. Most visible effects, which pose substantial questions, can be seen in the case of Romania, country in which despite wage and pension increases the at-risk-of-poverty rate is the highest 32.0% (2023), this attracting also other effects such as social exclusion. Comparable shares were recorded only in Bulgaria (30.0%) and Spain (26.5%).

Income inequalities triggering higher at-risk-of-poverty rate and social exclusion are often combined, as we noticed while elaborating the paper with lower access to education, in particular in rural areas. To this is added, the low appetite of employers, irrespective if they represent the public or the private sector for investing in the reskilling and upskilling of their employees. This is a direct indication of the relevance of institutional indicators related to various forms of cooperation between stakeholders in both sectors for creating favorable premises, under the pressure of the digital economy, for generating formal and informal education and training opportunities.

EU-wide, inequalities are triggered increasingly more by perceptions and attitudes related to migration for work, and to asylum seekers, and these become more acute in the context of the war in Ukraine, and the cost-of-living crisis.

The combination between the effects that the twin transition might generate, the somewhat vulnerable welfare state due to the latest evolutions are all factors contributing to increased instability for all member-states, and the EU-27 as a whole, because for ensuring a somewhat better economic and social climate inside the borders of their countries, governments might be tempted to trade-off shared goals at EU-level, for short-term benefits at national level.

It is clear that a paradigm shift needs to take place on the economic, social and institutional dimension for being able to attenuate foreseeable and unforeseeable impacts of external shocks, for increasing the attractiveness for investment flows from inside and outside the EU, in particular in fields related to innovation, and manufacturing, the most relevant ones being dedicated to cutting-edge chip manufacturing plants, but also investments for creating clusters and pools of research-development and innovation where the cooperation between businesses and the academic environment could contribute to increasing the competitiveness of the EU, and to reducing on long-term income disparities.

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