Maciej Ryczkowski
Nicolaus Copernicus University in Toruń
e-mail: m_ryczkowski@umk.pl
ORCID: 0000-0003-2156-6823

DOI: 10.15290/oes.2025.04.122.09

THE PARADOX OF GROWTH AND WELFARE DISPARITIES IN THE EU – CROSS-COUNTRY PATTERNS[1]

Summary

Purpose | This article develops a new objective welfare index for 25 European Union countries, integrating economic, social, environmental, labour market, inequality, knowledge-based, and health dimensions. The goal is to investigate the relationships between the new welfare index, economic growth and self-reported life satisfaction.

Research method | The analysis employs taxonomic analysis based on proximity to an abstract ideal solution and Spearman and Kendall correlation coefficients.

Results | Contrary to the post-growth theories, a persistent, positive, and linear relationship is identified at the aggregate level between past average economic growth *per capita* and contemporary welfare among the advanced Eurozone economies. Conversely, non-Eurozone countries and recent euro adopters from Eastern Europe exhibit a paradoxical negative correlation. The non-linear relationship between the contemporary GDP per capita and welfare, identified at the cross-country level, indicates diminishing returns to welfare as GDP *per capita* approaches the 9th percentile. Welfare strongly correlates with self-reported life satisfaction; however, discrepancies reveal optimistic (Italy, Luxembourg, Denmark, Finland) and pessimistic nations (Hungary, Portugal, Poland, Slovenia, France, Ireland).

Originality/value/implications/recommendations | The article's findings challenge traditional theories and provide new insights for the design of sustainable welfare policies. This is the first study to uncover and systematically analyse divergent patterns

[1] The article was financed by Nicolaus Copernicus University in Toruń.

among Eurozone countries, more recent euro adopters from Eastern Europe, and non-Eurozone economies

Keywords: Welfare Index, post-growth theory, Eurozone disparities, sustainable development, growth and welfare

JEL classification: I31, F45, Q56, D63

1. Introduction

The post-growth perspective, as advocated by Walker et al. [2024, 2021], argues for building societal well-being independent of continuous economic growth, highlighting concerns about economic stagnation, ecological limits, and sustainability. This study investigates whether the interdependence between economic growth and welfare has diminished among the high-developed major Eurozone members, where it is getting hard to achieve welfare improvements beyond a certain level, and where the increasing relative welfare costs and lower economic growth rates compared to emerging economies could disrupt the traditional link between economic growth and welfare. Conversely, emerging economies are expected to remain heavily dependent on economic growth to influence welfare, as they strive to attain a level of prosperity comparable to that of more developed nations.

Using Eurostat data and taxonomic analysis based on proximity to an abstract ideal solution [Hellwig, 1968; Walesiak, 2017], this article develops a novel synthetic welfare index for 25 European Union (EU) countries[2] in 2021. The approach is inspired by Jones and Klenow's [2016] concept of a summary statistic for economic well-being, which incorporates consumption, mortality, and inequality, and Bannister and Mourmouras's [2017] proposal to account for environmental considerations. We proxy consumption with gross dispos-

[2] Austria, Belgium, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland. The sample of countries was determined by the availability of Eurostat data required to construct the welfare index proposed in this article.

able household income *per capita* (PPP) and replace mortality with health expectancy. Additionally, we extend the index to include labor market conditions, reflecting the significant influence of labor market dynamics on public well-being [Ręklewski, Ryczkowski, 2016]; education, based on findings that human capital positively impacts social welfare [Bosi et al., 2023]; and high-speed Internet coverage as a critical element of knowledge-based economies [Growiec, 2023; Kryk, 2021].

The second goal of this study is to investigate the relationships between the newly constructed welfare index and: (1) past annual average economic growth *per capita* over two distinct periods, 2001–2021[3] (spanning two decades) and 2011–2021 (spanning one decade); (2) contemporary GDP *per capita* in 2021; and (3) self-reported life satisfaction, as measured by the World Bank in 2021. These relationships are analysed using Spearman and Kendall correlation coefficients to identify cross-country patterns rather than within-country historical trajectories. This straightforward approach identifies novel empirical patterns without being influenced by a priori assumptions.

The findings of this study reveal a paradox when examining cross-country patterns. Among the major euro area economies and non-euro countries with the highest GDP *per capita*, the aggregate relationship between the past average economic growth *per capita* and the contemporary welfare is linear, significant, and positive, contradicting the decoupling anticipated by the post-growth theory. This suggests that, at the cross-national level, current welfare in advanced EU economies remains closely linked to the past economic growth. Conversely, in the group of faster-growing, catching-up EU economies – many of which are non-euro adopters or part of the Eastern bloc – the relationship is unexpectedly negative. This inverse correlation between the current welfare and the past economic growth *per capita* challenges the conventional economic theories, including human capital frameworks and standard growth models, and instead, aligns with the notion of trade-offs or decoupling between economic growth and welfare.

[3] The investigated time span was determined by data availability in Eurostat for the 25 EU member states.

The relevance of this article lies in examining the nexus between economic performance and the quality of life of its citizens, which is essential for designing sustainable regional welfare systems. Notably, it is the first study to uncover and analyse divergent patterns among Eurozone countries, more recent euro adopters from Eastern Europe, and non-Eurozone nations. Our new index is comprehensive while remaining intuitive and objective, as it is not reliant on self-perceived prosperity or subjective opinions.

The remainder of the article is organised as follows: Section 2 introduces the selected welfare indicators and provides a review of the literature on the relationship between output growth and welfare. Section 3 outlines the data and the methodological framework, while Section 4 presents the empirical findings.

2. Literature review

Economic growth and welfare are distinct concepts, a distinction perhaps best captured by Mahbub ul Haq's [2003] critique: "Any measure that values a gun several hundred times more than a bottle of milk is bound to raise serious questions about its relevance for human progress". Traditional economic growth measures are often used as proxies for welfare, but they overlook the dimensions like inequality, health, environmental sustainability, labour market conditions or education, to list just a few. This limitation has led to the development of numerous welfare indices, ranging from relatively simple measures, such as the Human Development Index (HDI), which omit several key aspects of welfare, to much more complex indices. While these complex indices offer greater comprehensiveness, they often pose challenges in interpretation at the aggregate level, making cross-country comparisons difficult to analyze and understand. A comprehensive presentation of all human development indicators is beyond the scope of this discussion due to space constraints. Instead, Table 1A in the Appendices highlights the HDI and its major alternatives, their key assumptions, and selected critiques.

Modern economies heavily depend on economic growth to sustain prosperity [see, Wisnujati et al., 2024; Edeme, 2018; Dollar et al., 2015]. The rationale for this reliance is intuitive: economic growth enhances welfare by increasing

resources for public goods, reducing poverty, and improving living standards. However, diminishing returns to welfare, environmental degradation, and rising income inequality can constrain these positive effects, particularly in the advanced economies where basic needs are already met.

Post-growth theorists advocate for a paradigm shift, emphasising qualitative improvements in welfare rather than relying on the quantitative economic expansion. This perspective confronts the fundamental challenges, including: (1) securing adequate funding for welfare systems in economies without growth, (2) managing the escalating costs of welfare in relation to economic performance, (3) dismantling the entrenched structural and behavioral reliance on growth within welfare systems, (4) addressing the mounting demands on limited planetary resources, and (5) overcoming significant political resistance to reforming the welfare state [Walker et al., 2021].

Ding [2012] underscores the necessity of designing welfare systems that are growth resilient, presenting evidence of a negative impact of welfare expenditure on GDP growth. The study specifically points out that pension spending tends to create a self-reinforcing cycle, making it both unsustainable and detrimental to economic growth. This effect is particularly pronounced in the context of greenhouse gas emission policies, which further constrain growth by necessitating higher taxation. The trade-off between optimising economic growth and welfare varies, with growth-maximising tax rates potentially exceeding, falling below, or aligning with welfare-maximising rates [Misch et al., 2013]. However, even the substantial differences in these rates often result in only minor variations in growth and welfare outcomes [Misch et al., 2013]. The interdependence between welfare systems and economic growth is bidirectional, as welfare states can both positively and negatively impact economic growth depending on the specific context and time frame [Büchs, 2021].

It is also important to briefly note the complexity of the relationship between welfare measures based on "hard" statistical data and self-reported life satisfaction derived from "soft" subjective assessments. This relationship is inherently difficult to interpret, as it may be influenced by numerous factors not considered in this article, such as cultural norms, institutional trust, political stability, social cohesion, or individual expectations. Indeed, Kubiszewski et

al. [2018] demonstrate that individuals' perceptions capture only a limited subset of the objective conditions underpinning their well-being. Nevertheless, we identify GDP *per capita* as a missing – albeit imperfect – link between welfare indices and self-reported life satisfaction. Jones and Klenow [2016], among others, found that welfare is highly correlated with GDP *per capita*, while World Bank evidence also documents a clear and positive relationship between self-reported life satisfaction and GDP *per capita*. This suggests that objective welfare indices based on statistical data can be expected to exhibit a certain degree of correspondence with well-being measures grounded in the subjective perceptions of citizens.

In summary, the development of sustainable welfare systems requires a comprehensive understanding of the involved multifaceted interdependencies and coordinated efforts to address their mutual influences. While economic growth can have both positive and negative effects on welfare, and various welfare components can, in turn, influence growth, the significance, strength, and direction of these relationships depend on the nature and inclusiveness of growth, as well as on the considerations of sustainability and equity. Our findings demonstrate that these differences are particularly pronounced across EU countries.

3. Data and methodology

The study compares welfare in 25 European Union countries using a synthetic welfare index based on the distance from an abstract ideal solution [Hellwig, 1968; Walesiak, 2017], a method similar to the Technique for Order of Preference by Similarity to Ideal Solution [Balcerzak, Pietrzak, 2017]. Alternative approaches include a synthetic measure derived from averaging diagnostic variables by Szczepaniak and Szulc-Obłoza [2020], a median-based taxonomic analysis by Ryczkowski and Ręklewski [2021] or cluster analysis, among others [Lach, Malaga, 2023].

The proposed synthetic welfare indicator is constructed using $k = 11$ annual indices obtained from Eurostat, organised into seven dimensions: a decent standard of living (indicator: disposable income *per capita*), labour market

conditions (employment rate, long-term unemployment, and NEET), poverty and inequality (risk of poverty and Gini coefficient), a knowledgeable society (tertiary education attainment and early school leavers), a knowledge-based economy (high-speed internet coverage), long and healthy life (health expectancy), and environmental sustainability (greenhouse gas emissions) as outlined in greater detail in Table 2A in the Appendices. Table 2A in the Appendices depicts the variables and dimensions that constitute the welfare indicator.

The associations between the new welfare index, economic growth, and self-reported life satisfaction from the World Bank are examined using Spearman and Kendall correlation coefficients, with the results visualised through OLS models (see Table 3A for key descriptive statistics).

The proposed welfare indicator (w_i) for 2021 is calculated using a linear ordering method and ranges from 0 (worst welfare) to 1 (optimal welfare). It measures the proximity of a given country's welfare to an abstract ideal solution, defined by the most favorable values of χ_{ki} indices across the 25 analysed countries for the same year. The final formula for w_i is:

$$w_i = 1 - \frac{d_{I0}}{d_0} \tag{1}$$

where d_0 is the total distance between the abstract ideal solution and the minimum z_j values for all of the transformed into boosters and normalised indices for all countries, while d_{I0} represents the distance from the abstract ideal solution:

$$d_{I0} = \sqrt{\sum_{j=1}^{d} \left(z_{ki} - z_i^P \right)^2} \tag{2}$$

The indices χ_{ki} were transformed into boosters and normalised using classical methods:

$$z_{ki} = \frac{x_{ki} - \overline{x_{ij}}}{s_i(x)} \tag{3}$$

where $\overline{x_i}$ is the mean, and $s_i(x)$ is the standard deviation. Detractors (e.g., long-term unemployment, greenhouse gas emissions, early school leavers, NEET, at-risk-of-poverty rate, and Gini coefficient) were transformed into boosters by multiplying the indices by −1. In the baseline scenario, all diagnostic variables were assigned equal weights. This approach follows the linear ordering method proposed by Hellwig [1968], where a variable M_i is defined as a booster if for any two observations $(x_{ij}^S \text{ and } x_{kj}^S)$ referring to countries A_i and $A_k, x_{ij}^S \succ x_{kj}^S$ implies $A_i \succ A_k$ [Hellwig, 1981, p. 48; Walesiak, 2016].

4. Empirical results

Contrary to the expectations of the post-growth proponents, our findings indicate a positive, linear, and statistically significant relationship between the past average real GDP growth *per capita* (2001–2021) and our objective welfare indicator in advanced EU economies in 2021. Specifically, higher past average economic growth *per capita* corresponds to higher contemporary welfare levels (Spearman's rank correlation: 0.7; Kendall's rank correlation: 0.56). This result challenges the post-growth hypothesis, which anticipates a decoupling of welfare from economic growth. Notably, all major euro area countries that adopted the euro in 1999, except Ireland, fall into this group (see the lower part of Chart 1, Model 1b).

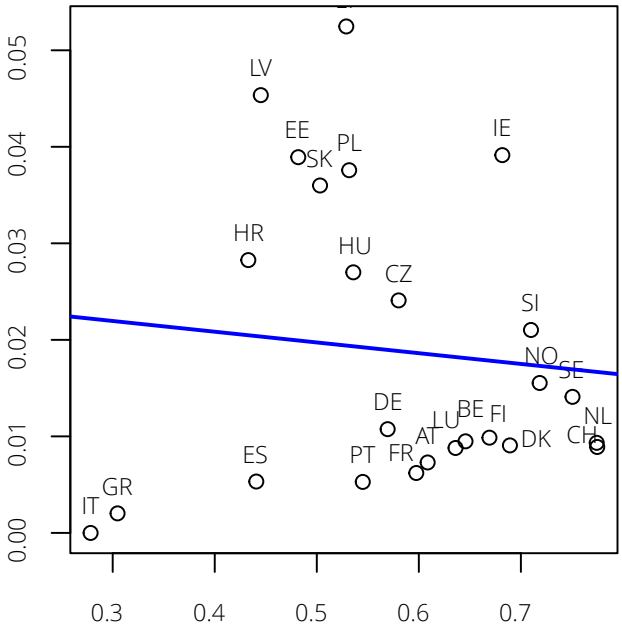
Interestingly, for countries outside the euro area or Eastern European nations that adopted the euro more recently, the relationship is less clear. In these cases, the estimated link is negative, meaning that higher past average real *per capita* growth over the 20-year period corresponds to a lower welfare indicator in 2021. This finding poses a paradox, as it contradicts traditional theories suggesting that economic growth enhances welfare, as well as human capital theories asserting that development should reinforce growth. It also stands in opposition to post-growth theories predicting the disappearance of this linkage. The effect is, however, not statistically significant (see the upper part of Chart 1, Model 1a).

Our findings for countries outside the euro area and Eastern Europe align with the studies suggesting a trade-off between economic growth and welfare

[Misch et al., 2013]. While the underlying reasons for this counterintuitive outcome are beyond the scope of this study, it remains puzzling – particularly given that a positive relationship between economic growth and objective welfare would be expected over a two-decade period in relatively less developed European economies. In these countries, higher income could have been utilised to finance welfare improvements, at least in dimensions influenced by government policies. It is possible that unexamined factors or country-specific characteristics contributed to the patterns depicted in Chart 1 (Model 1a). Further research is needed to investigate this phenomenon in greater depth.

CHART 1

Welfare in 2021 and Average Real Economic Growth *per Capita* (2001–2021)



Notes: The welfare indicator ranges from 0 (worst welfare) to 1 (optimal welfare). The estimated linear regression for all countries is depicted in blue (thick), with average *per capita* growth as the dependent variable. The chart illustrates the divergent relationships between welfare and average *per capita* growth observed in two groups of countries: one generally comprising the major euro area members and the other consisting of non-euro area countries or relatively recent euro area members from Eastern Europe. Refer to Table 4A in the Appendices for the model estimates.

Source: the Author's own work.

When analysing all the countries collectively, no clear pattern emerges (Chart 1, Model 1: All Countries depicted in thick blue). We failed to reject the null hypothesis of no rank correlation with Spearman's rank correlation of -0.04 (*p*-value = 0.84), and Kendall's rank correlation of -0.04 (*p*-value = 0.80). The estimated linear regression (Model 1 in Chart 1) indicates a negative relationship; however, it is statistically insignificant, with an exceptionally low R^2. TThe evidence presented in Chart 1 remains robust to variations in the time span used for calculating average real economic growth per capita, as demonstrated in Chart 1A in the appendices, where the time span is shortened to a decade (2011–2021).

When examining contemporary welfare in relation to contemporary GDP *per capita*, a visible but imperfect association emerges (Chart 2). This relationship is better captured by the quadratic nonlinear regression ($R^2 = 0.46$) compared to the linear regression shown in blue ($R^2 = 0.39$). Spearman's rank correlation is 0.76 (p-value < 0.01), and Kendall's rank correlation is 0.53 (p-value < 0.01), both of which are statistically significant.

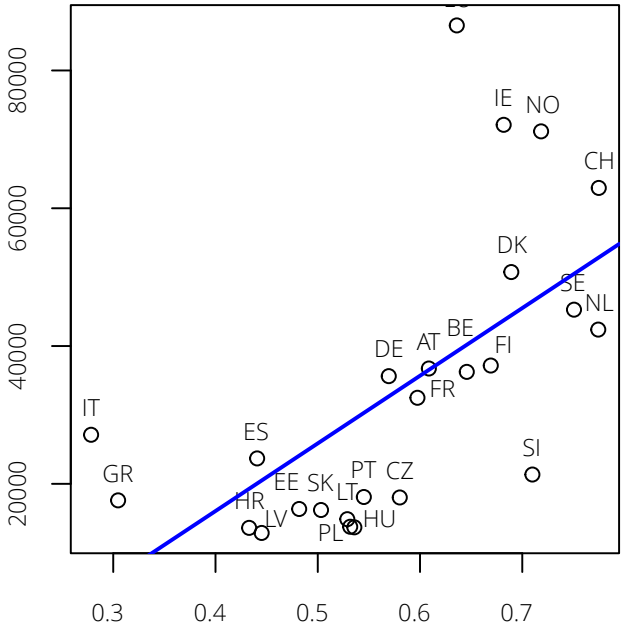
Assuming a nonlinear relationship suggests that beyond a threshold of approximately €60000 GDP *per capita*, further increases in GDP have a limited effect on objective welfare. Certain measures, such as high-speed internet coverage, may already be maximized, while others, such as healthy life expectancy, are challenging to significantly improve. This implies that there may be a natural upper limit to welfare, which could only be expanded by introducing additional variables albeit at the cost of increased complexity and challenges in interpretation. Alternatively, the nonlinear relationship may indicate that beyond a certain threshold, additional economic growth yields diminishing returns in terms of welfare. For countries with the lowest GDP *per capita*, the nonlinear relationship suggests that increases in GDP should translate into improved objective welfare (Chart 2).

However, it is important to acknowledge the relatively weak association observed, particularly below the €2000–€3000 GDP *per capita* threshold. Among these countries, similar GDP *per capita* levels correspond to significantly different objective welfare outcomes, suggesting that diverse welfare achievements are possible even within economies of comparable size. For example, while Slovenia, Italy, and Greece share comparable GDP *per capita*, Slovenia

achieves a welfare index of approximately 0.7, compared to about 0.3 in Italy and Greece. Meanwhile, countries such as Poland, Portugal, and the Czech Republic, among others, fall somewhere in between these values (Chart 2). This finding suggests that countries may meet the needs of their citizens to varying degrees without substantial reliance on GDP *per capita*.

CHART 2

Welfare and GDP *per Capita* (in Euro) at Market Prices, 2021



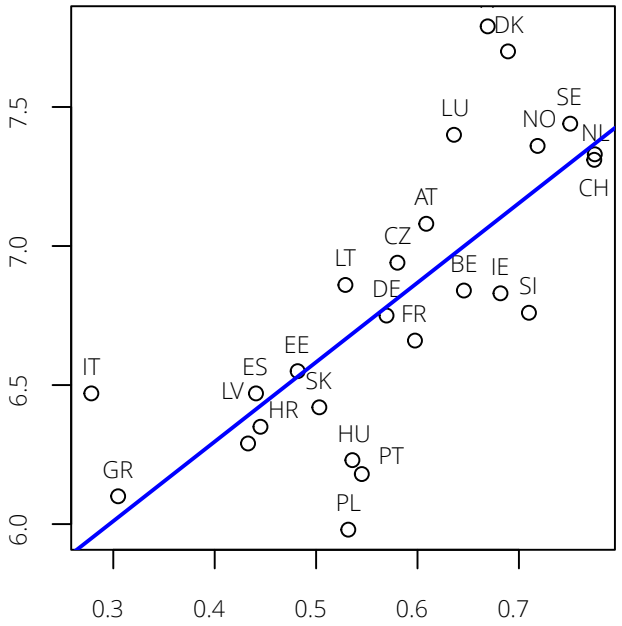
Notes: The welfare indicator ranges from 0 (worst welfare) to 1 (optimal welfare). The estimated linear regression for all countries is depicted in thick blue, with GDP *per capita* in euro currency as the dependent variable ($R^2 = 0.39$). Refer to Table 4A in the Appendices for the model estimates.

Source: the Author's own work.

Welfare improvements are of key importance for the society, because as it is evidenced in Chart 3, they correlate with higher levels of self-reported life satisfaction. The contemporary relationship between our welfare indicator and subjective life satisfaction is positive, significant, and strong (see Chart 3, where the estimated linear regression for all countries is depicted in blue; Spearman's rank correlation = 0.77, *p*-value < 0.01, and Kendall's rank correlation = 0.54, *p*-value < 0.01).

CHART 3

Welfare in 2021 and Self-Reported Life Satisfaction (World Bank, 2021)



Notes: The welfare indicator ranges from 0 (worst welfare) to 1 (optimal welfare). Self-reported life satisfaction ranges from 0 (no life satisfaction) to 10 (highest possible life satisfaction). The estimated linear regression for all countries is depicted in blue (thick), with self-reported life satisfaction as the dependent variable ($R^2 = 0.56$). Refer to Table 4A in the Appendices for the model estimates.

Source: the Author's own work.

The analysis reveals countries that appear overly pessimistic in their self-reported life satisfaction compared to their objective welfare, including Hungary (HU), Portugal (PT), Poland (PL), Slovenia (SI), and, to a lesser extent, France (FR) and Ireland (IE). Conversely, some nations, such as Italy (IT), Luxembourg (LU), Denmark (DK), and Finland (FI), appear overly optimistic in this regard. Further investigation is required to understand these discrepancies, which lies beyond the scope of this study.

Finally, we draw the reader's attention to the diverse economic growth rates among EU countries, as illustrated in Chart 1. Although this issue lies beyond the scope of the paper, it is noteworthy that major euro area countries, with the exception of Ireland, exhibit relatively lower average *per capita* economic

growth. This observation may be consistent with the convergence hypothesis or could reflect potential costs associated with joining a monetary union that does not constitute an optimal currency area [Willett, Bird, 2024; Kim, 2024]. The latter interpretation is supported by the lowest average *per capita* growth rates observed in peripheral euro area countries such as Italy, Greece, Spain, and Portugal within our sample. Ireland, however, represents a notable exception, displaying extraordinary economic growth [see: Boehlke et al., 2019].

5. Conclusions

This article constructs a synthetic welfare index for 25 European Union countries in 2021, integrating economic, social, environmental, labour market, inequality, knowledge-based, and health-related factors. This new welfare index, based on proximity to an abstract ideal solution, offers a comprehensive yet intuitive measure of the objective well-being, enabling an examination of the relationships between the objective welfare, contemporary and past average economic growth *per capita* over one- and two-decade periods, and contemporary subjective well-being across the studied countries. These relationships are analysed using Spearman and Kendall correlation coefficients, with results visualised through cross-country charts. This straightforward approach uncovers novel transnational empirical patterns without being influenced by a priori assumptions.

The article's findings challenge the prevailing assumptions of the post-growth paradigm, which advocates for the decoupling of welfare from economic growth. Contrary to these expectations, the analysis reveals a significant, positive, and linear relationship, at the aggregate level, between past average economic growth *per capita* and contemporary welfare levels among founding euro area countries that adopted the euro since 1999, Greece (since 2012), and the largest non-euro economies in terms of GDP *per capita* (Switzerland, Sweden, Norway, and Denmark), with the notable exception of Ireland.

Conversely, we identify a puzzling inverse relationship at the group level between past average economic growth *per capita* and contemporary welfare in non-eurozone Eastern European countries (Poland, Hungary, and Czechia) and recently acceded euro area nations (Croatia, Latvia, Estonia, Slovakia,

Lithuania, and Slovenia). This result contradicts traditional economic growth theories and suggests a possible trade-off between economic growth and welfare or the decoupling of welfare from economic growth in these catching-up EU economies when analysed collectively.

The study also underscores the nonlinear relationship between contemporary GDP *per capita* and welfare, with evidence suggesting diminishing returns to welfare beyond a GDP threshold (of approximately €60000 *per capita*). Finally, an important insight from this research is the significant and strong correlation between the objective welfare and the self-reported life satisfaction, affirming the importance of welfare improvements in enhancing societal well-being. However, discrepancies between subjective life satisfaction and the article's new objective welfare measure – evident in nations exhibiting over- ((Italy, Luxembourg, Denmark, Finland) or underestimation of life satisfaction (Hungary, Portugal, Poland, Slovenia, France, Ireland) – highlight the need for further interdisciplinary inquiry into the socio-cultural, institutional, and psychological factors influencing these disparities.

This paper provides further evidence for the widely recognized view that GDP *per capita* is an imperfect measure of economic welfare. While GDP *per capita* remains a broadly satisfactory indicator of welfare – and is also reasonably correlated with self-reported well-being across EU countries – it fails to capture important heterogeneities. The analysis demonstrates that some advanced EU economies, despite high GDP *per capita*, rank lower in welfare once additional dimensions such as health, labor market conditions, environmental sustainability, and education are incorporated. Conversely, several EU countries with comparatively lower GDP *per capita* appear better off when these broader welfare determinants are taken into account. This suggests that the real distance in welfare outcomes across countries cannot be accurately assessed by GDP *per capita* alone.

From a policy perspective, these findings underscore the importance of adopting multidimensional welfare metrics in the design and evaluation of economic policy. The policymakers should integrate complementary indicators into monitoring frameworks to ensure that welfare assessments reflect the lived realities of citizens rather than output alone. Finally, at the EU level, cohesion policies would benefit from adopting multidimensional welfare indices, allowing for a more accurate targeting of resources and a fairer evaluation of progress.

Specifically, we emphasise that the welfare index constructed in this article is subject to several limitations. It aggregates across countries according to one set of preferences, without exploring alternative functional forms or parameter values. As a result, different choices of welfare determinants could yield substantially different outcomes. The index does not incorporate certain dimensions highlighted in the literature, such as public safety, political freedom, crime or intergenerational altruism. Since there is no unique or objective criterion for selecting the "optimal" determinants of welfare, it is difficult to establish the superiority of our index over alternative proposals. As with other aggregated welfare measures, the index must be interpreted in light of the variables chosen to construct it. Moreover, the method based on the Hellwig–Walesiak approach pertains to linear relationships, while Spearman's and Kendall's correlation coefficients are likewise grounded in linearity – an approach that is easier to implement and interpret, yet less appropriate for capturing the inherently nonlinear nature of socio-economic reality.

Furthermore, a key limitation of this study regards its focus on cross-country relationships, meaning that the identified patterns reflect broader comparative trends rather than causal mechanisms within individual countries over time. However, these limitations do not diminish the relevance of the findings, which underscore the possibility of significant variability in available welfare levels, despite substantial variations in contemporary GDP levels or average past economic growth rates across nations. These disparities, in turn, have substantial and direct implications for the subjective well-being across the analysed countries. Future research could address some of the limitations by employing longitudinal analyses or country-specific case studies to trace the evolution of these relationships within national contexts, testing alternative functional forms and welfare determinants, and extending the analysis to include additional post-COVID years to capture potential longer-term effects.

In conclusion, this study enhances the understanding of the relationship between economic growth and welfare, identifying divergent patterns across Europe and providing valuable insights at the cross-country level. This research lays the groundwork for future investigations aimed at fostering sustainable and inclusive welfare systems.

References

Balcerzak A.P., Pietrzak, B.M., 2017, *Digital Economy in Visegrad Countries. Multiple-criteria Decision Analysis at Regional Level in The Years 2012 and 2015*, "Journal of Competitiveness", no. 9(2), pp. 5–18, DOI: 10.7441/joc.2017.02.01.

Bannister M.G.J., Mourmouras M.A., 2017, *Welfare vs. Income Convergence and Environmental Externalities*, International Monetary Fund (WP/17/271).

Boehlke J., Fałdziński M., Gałecki M., Osińska M., 2019, *Econometric Analysis of Economic Miracles in Selected Economies Using TECM Approach*, [in]: *Economic Miracles in the European Economies*, Osińska, M. (ed.), Springer International Publishing, Cham.

Bosi S., Camacho C., Desmarchelier D., 2023, *Human Capital and Welfare*, "Oxford Economic Papers", no. 75(2), pp. 307–324, DOI: 10.1093/oep/gpac020..

Büchs M., 2021, *Sustainable Welfare: Independence between Growth and Welfare Has to Go Both Ways*, "Global Social Policy", no. 21(2), pp. 323–327, DOI: 10.1177/14680181 211019153.

Ding, H., 2012, *Economic Growth and Welfare State: a Debate of Econometrics*, MPRA Paper, no. 40288.

Dollar D., Kleineberg T., Kraay A., 2015, *Growth, Inequality and Social Welfare: Cross-country Evidence*, "Economic Policy", no. 30(82), pp. 335–377, DOI: 10.1093/epolic/ eiv001.

Edeme R.K., 2018, *Revisiting the Economic Growth-welfare Linkages:Empirical Evidence from Nigeria*, "Asian Themes in Social Sciences Research", no. 1(1), pp. 28–33, DOI: 10.33094/journal.139.2018.11.28.33.

Growiec J., 2023, *Industry 4.0? Framing the Digital Revolution and Its Long-Run Growth Consequences*, "Gospodarka Narodowa. The Polish Journal of Economics", no. 316(4), pp. 1–16, DOI: 10.33119/GN/175243.

Hellwig Z., 1968, *Zastosowanie metody taksonomicznej do typologicznego podziału krajów ze względu na poziom ich rozwoju oraz zasoby i strukturę wykwalifikowanych kadr*, "Przegląd Statystyczny", no. 15(4), pp. 307–327.

Hellwig Z., 1981, *Wielowymiarowa analiza porównawcza i jej zastosowanie w badaniach wielocechowych obiektów gospodarczych*, [in:] *Metody i modele ekonomiczno-matematyczne w doskonaleniu zarządzania gospodarką socjalistyczną*, Welfe W. (ed.), PWE, Warszawa.

Hickel J., 2020, *The Sustainable Development Index: Measuring the Ecological Efficiency of Human Development in the Anthropocene,* "Ecological Economics", vol. 167, p. 106331, DOI: 10.1016/j.ecolecon.2019.05.011.

Jones C.I., Klenow, P.J., 2016, Beyond GDP? *Welfare across Countries and Time*, "American Economic Review", no. 106(9), pp. 2426–57, DOI: 10.1257/aer. 20110236.

Kim W.D., 2024, *A Study on a New Fiscal Risk-sharing System to Make Eurozone an OCA*, "International Journal of Finance & Economics", no. 29(2), pp. 2415–2427, DOI: 10.1002/ijfe.2790.

Kryk B. 2021, *Generations on the Polish Labor Market in the Context of Competences Needed in the Economy Based on Knowledge and 4.0*, "Ekonomia i Prawo. Economics and Law", no. 20(1), pp. 121–137, DOI: 10.12775/EiP.2021.008.

Kubiszewski I., Zakariyya N., Costanza, R. 2018, *Objective and Subjective Indicators of Life Satisfaction in Australia: How Well Do People Perceive What Supports a Good Life?*. "Ecological Economics", no. 154, pp. 361–372, DOI: 10.1016/j.ecolecon.2018. 08.017.

Lach B., Malaga K. 2023, *Changes on Economic Freedom in 11Ppost-socialist Countries of Central-Eastern and South-Eastern Europe in 1996–2022*, "Ekonomia i Prawo. Economics and Law", no. 22(2), pp. 251–274, DOI: 10.12775 /EiP.2023.015.

Misch F., Gemmell N., Kneller R. 2013, *Growth and Welfare Maximization in Models of Public Finance and Endogenous Growth,* "Journal of Public Economic Theory", no. 15(6), pp. 939–967, DOI: 10.1111/jpet.12038.

Morris M.D., 1978, *A Physical Quality of Life Index*. "Urban Ecology", no. 3(3), pp. 225–240, DOI: 10.1016/0304-4009(78)90015-3.

Ręklewski M., Ryczkowski M., 2016, *The Polish Regional Labour Market Welfare Indicator and Its Links to Other Well-being Measures*, "Comparative Economic Research. Central and Eastern Europe", no. 19(3), pp. 113–132, DOI: 10.1515/cer-2016-0023.

Ryczkowski M., Ręklewski M., 2021, *Macroeconomic Performance of Countries across Monetary Policy Regimes from 2000 to 2017*, "Economic Research-Ekonomska Istraživanja", no. 34(1), pp. 1224–1243, DOI: 10.1080/1331677X.2020.1820360.

Szczepaniak M., Szulc-Obłoza A., 2020, *Labour Market Institutions and Income Inequalities in the Visegrad Group Countries*, "Comparative Economic Research. Central and Eastern Europe", no. 23(3), pp. 75–90, DOI: 10.18778/1508-2008.23.21.

Talberth J., 2007, Genuine Progress Indicator (GPI), *Beyond GDP*, European Commission, Luxembourg: Office for Official Publications of the European Communities, no. 270. DOI: 10.2779/54600.

Ul Haq M., 2003, *The Birth of the Human Development Index*, "Readings in Human Development", no. 2, pp. 127–137, DOI: 10.1093/oso/9780195101911.003.0004.

Walesiak M., 2016, *Visualization of Linear Ordering Results for Metric Data with the Application of Multidimensional Scaling*, "Ekonometria", no. 2(52), pp. 9–21, DOI: 10.15611/ekt.2016.2.01.

Walesiak M., 2017, *The Application of Multidimensional Scaling to Measure and Assess Changes in the Level of Social Cohesion of the Lower Silesia Region in the Period 2005–2015*, "Ekonometria", no. 3(57), pp. 9–25, DOI: 10.15611/ekt.2017.3.01.

Walker C.C., Druckman A., Jackson T., 2021, *Welfare Systems without Economic Growth: A Review of the Challenges and Next Steps for the Field*, "Ecological Economics", vol. 186, p. 107066, DOI: 10.1016/j.ecolecon.2021.107066.

Walker C.C., Druckman A., Jackson T., 2024, *Growth Dependency in the Welfare State–An Analysis of Drivers in the UK's Adult Social Care Sector and Proposals for Change*, "Ecological Economics", vol. 220, p. 108159, DOI: 10.1016/j.ecolecon.2024. 108159.

Willett T.D., Bird, G., 2024, *A Tale of Two Trilemmas: Comparing the International Monetary and Financial Trilemmas*, "Journal of International Commerce, Economics and Policy", vol. 15(02), p. 2450007, DOI: 10.1142/S1793993324500078.

Wisnujati N.S., Suhendar I., Samiun M.Z.M., Hadikusumo R.A., Jacob J., 2024, *Dynamics of Economic Growth and Its Influence on Community Welfare: Case Analysis in Developing Countries*, "Global International Journal of Innovative Research", no. 1(2), pp. 182–187, DOI: 10.59613/global.v1i2.27.

APPENDIX

TABLE 1A

Selected indicators

Indicator	Method and comments
	Relatively simple indicators
The Morris's physical quality of life index (PQLI) [Morris, 1978]	PQLI was among the earliest frameworks to conceptualise human development. It incorporates three key indicators: literacy rates, infant mortality, and life expectancy at age one. The PQLI is calculated as an equally weighted summation of these components. Notably, the PQLI lacks any direct connection to a country's economic status.
Human Development Index (HDI)	The HDI is a geometric mean of the gross national income *per capita*, long and healthy life (life expectancy index), and being knowledgeable (expected and mean years of schooling). Before 1990, human development was measured predominantly by economic growth. The HDI revolutionized the concept of "development" by incorporating non-economic dimensions. However, it has been criticized for offering limited additional insight beyond what is already captured by GDP *per capita*. Moreover, HDI provides limited scope for improvement for countries that already exhibit high gross national income *per capita* and life expectancy scores.
The Sustainable Development Index (SDI) of Hickel [2020]	The SDI is based on the HDI framework but incorporates a threshold for *per capita* income, determined by two indicators of ecological impact: CO_2 emissions and material footprint. These indicators are assessed within the context of planetary boundaries. Unlike the SDI, the HDI does not account for ecological considerations and contravenes sustainability principles, given the strong correlation between income and negative environmental externalities. Achieving safe levels of ecological impact can result either from deliberate policy measures or from the characteristics of less resource-intensive economies. Consequently, it can be challenging to discern whether certain countries achieve their rankings due to proactive actions or due to underdevelopment.

Indicator	Method and comments
Inequality-adjusted Human Development Index (IHDI)	The IHDI, like the HDI, is calculated as the geometric mean of the HDI's dimension indices. However, the key difference is that the IHDI is adjusted for inequality. Specifically, the IHDI combines a country's average achievements in gross national income *per capita*, life expectancy, and being knowledgeable, with the distribution of these achievements across the population. The IHDI „discounts" each dimension's average value according to its level of inequality. In the case of perfect equality, the IHDI equals the HDI. As inequality increases, the IHDI decreases. Despite its adjustment for inequality, the IHDI shares similar criticisms with the HDI, with the main difference being the inclusion of an inequality measure.
Gender Development Index (GDI)	The GDI measures the gender gap in the HDI by expressing the female HDI as a percentage of the male HDI. However, the gender HDI gap is unadjusted, meaning it does not account for factors such as age, occupation, region, or other variables that may influence the disparity.
Gender Inequality Index (GII)	The GII is based on the same framework as the IHDI, reflecting the loss in potential human development due to gender disparities across three key dimensions: reproductive health (measured by maternal mortality ratio and adolescent birth rates), empowerment (captured by the proportion of parliamentary seats occupied by females and the proportion of adult females and males aged 25 and older with at least some secondary education), and the labor market (assessed through the labour force participation rate of females and males aged 15 and older).
Happy Planet Index (HPI)	The HPI combines environmental footprint data with the subjective life satisfaction and life expectancy at birth. The ecological footprint represents the average *per capita* land required to support typical consumption patterns, including land used for food production, forestry, biofuels, and areas of the ocean for fishing. This footprint is estimated using regression models based on GDP *per capita*, CO2 emissions, levels of urbanization, and latitude. To calculate the HPI, we multiply the mean life expectancy of a country's residents by their mean self-reported well-being, yielding the Happy Life Expectancy. This value is then divided by the country's ecological footprint *per capita* to determine the Happy Life Years produced per unit of demand on the natural environment. Unlike GDP and HDI, the HPI incorporates sustainability considerations. It is important to note that self-reported happiness is subjective and culturally influenced.
The Happiness Index of the United Nations	The Average Life Evaluation in the World Happiness Report is derived from the mean Cantril ladder scores of respondents. The resulting happiness index for each country is subsequently explained by six key variables: GDP *per capita*, social support, healthy life expectancy, freedom, generosity, and perceptions of corruption.

Indicator	Method and comments
	Relatively complex indicators
Social Progress Index (SPI) of Social Progress Imperative	SPI accounts for 53 social and environmental indicators. These indicators are grouped into three broad dimensions: Basic Human Needs, Foundations of Wellbeing, and Opportunity. Each dimension comprises four components: nutrition and basic medical care, water and sanitation, shelter, personal safety, access to basic knowledge, access to information and communication, health and wellness, environmental quality, personal rights, personal freedom and choice, inclusiveness, and access to advanced education. These components further subdivide the indicators into detailed thematic categories. SPI doesn't measure people's life satisfaction. It focuses on actual life outcomes instead. The SPI captures the multi-dimensional concepts of social development that is subject to the quality of data from various sources. The aggregated SPI data can obscure regional and state-level differences.
The OECD Better Life Index (BLI)	This BLI is founded on 11 topics encompassing material living conditions and quality of life: housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance. Each of these topics is represented by specific indicators. For instance, the housing dimension includes three indicators: the ratio of housing costs to household gross adjusted disposable income, the percentage of individuals with access to indoor flushing toilets in their homes, and the average number of rooms per person in a dwelling. The data underlying the BLI are harmonised, normalised, and aggregated within dimensions using equal weights. Additionally, users have the option to calculate a personalized BLI by applying their own weights to the indicators, as provided on the OECD website.
The Genuine Progress Indicator (GPI) of Talberth et. al. [2007]	The GPI adjusts GDP by subtracting the value of socially undesirable goods, services, and phenomena, including externalities such as inequality, the costs of war and crime, air pollution, loss of farmland, human health effects, loss of leisure time, and environmental degradation, among others. The GPI incorporates a total of 26 economic, environmental, and social indicators. However, the GPI suffers from inconsistent data and diverse calculation methods, which can introduce bias when comparing countries. Additionally, some of its limitations stem from its composite nature.

Source: the author's own work.

TABLE 2A

The Synthetic Objective Welfare Index

Indicators	Dimesions
Gross disposable household income per capita (PPP)	A decent standard of living
• Long-term unemployment rate from 15 to 74 years as percentage of population in the labour force • Total employment (resident population concept – LFS) from 15 to 64 years as percentage of total population • NEET (Young people from 15 to 29 years neither in employment nor in education and training) as percentage of total population	Labour market
• At risk of poverty rate in percentage (cut-off point: 60% of median equivalised income after social transfers) • Gini coefficient of equivalised disposable income – EU-SILC survey	Poverty and inequality
• Tertiary education (levels 5–8) in percentage (age class: from 15 to 64 years) • Early leavers from education and training from 18 to 24 years in percentage	Knowledgeable society
High-speed internet coverage in percentage of households	Knowledge-based economy
Healthy life expectancy based on self-perceived health (in absolute values at birth)	Long and healthy life
Net greenhouse gas emissions in tonnes per capita	Environment

Source: the author's own work.

TABLE 3A

Data and their descriptive statistics

Country	Year of euro adoption	GDP per capita in 2021 [euro]	Average real growth *per capita* (2011–2021)	Average real growth *per capita* (2001–2021)	Self-Reported Life Satisfaction by the World Bank in 2021	Our Welfare Indicator 10*
Italy	1999	27120	0.1%	0.0%	6.5	2.8
Greece	2002	17600	-1.0%	0.2%	6.1	3.0
Croatia	2023	13610	2.6%	2.8%	6.3	4.3
Spain	1999	23690	0.3%	0.5%	6.5	4.4
Latvia	2014	12870	3.8%	4.5%	6.4	4.5
Estonia	2011	16350	3.6%	3.9%	6.6	4.8
Slovakia	2009	16200	2.2%	3.6%	6.4	5.0
Lithuania	2015	14870	4.7%	5.2%	6.9	5.3
Poland	–	13770	3.6%	3.8%	6.0	5.3
Hungary	–	13690	3.0%	2.7%	6.2	5.4
Portugal	1999	18090	0.6%	0.5%	6.2	5.5
Germany	1999	35630	1.2%	1.1%	6.8	5.7
Czechia	–	18020	1.8%	2.4%	6.9	5.8
France	1999	32490	0.6%	0.6%	6.7	6.0
Austria	1999	36740	0.4%	0.7%	7.1	6.1
Luxembourg	1999	86540	0.3%	0.9%	7.4	6.4
Belgium	1999	36250	0.8%	0.9%	6.8	6.5
Finland	1999	37170	0.5%	1.0%	7.8	6.7
Ireland	1999	72110	6.5%	3.9%	6.8	6.8
Denmark	–	50740	1.4%	0.9%	7.7	6.9
Slovenia	2007	21350	1.7%	2.1%	6.8	7.1
Norway	–	71160	1.5%	1.6%	7.4	7.2
Sweden	–	45280	1.2%	1.4%	7.4	7.5
Netherlands	1999	42390	0.9%	0.9%	7.3	7.7
Switzerland	–	62950	0.8%	0.9%	7.3	7.7
	min	12870	-1.0%	0.0%	6.0	2.8
	max	86540	6.5%	5.2%	7.8	7.7
	average	33467	1.7%	1.9%	6.8	5.8
	s	20688	1.7%	1.5%	0.5	1.3

* Notes: The welfare indicator (multiplied by 10) and Self-Reported Life Satisfaction both range from 0 (worst result) to 1 (optimal result).

Source: the author's own work.

TABLE 4A

OLS Models

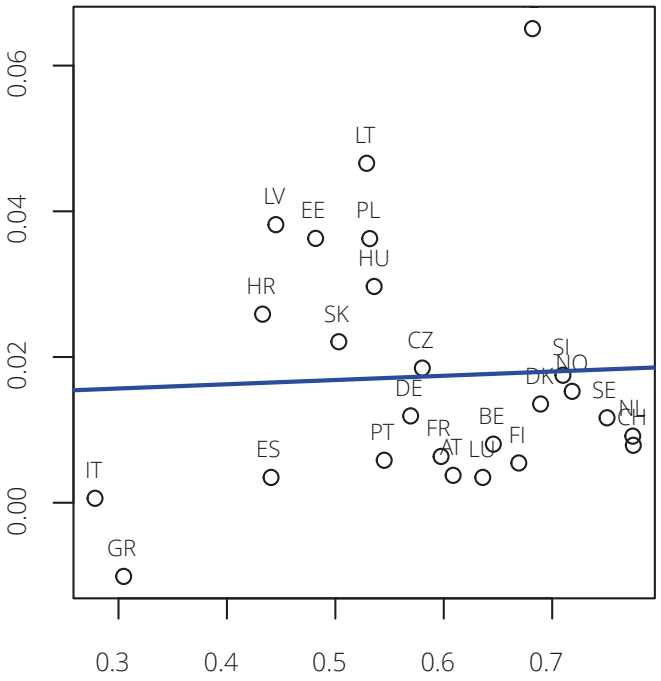
Model	α	w_i	w_i^2	*R*-squared, *F*-statistic
Model 1: All Countries	**0.025 (0.0138) [0.08]**	-0.011 (0.023) [0.64]	–	R: 0.01; F: 0.23 [0.64]
Model 1a	0.0599 (0.039) [0.18]	0.047 (0.077) [0.57]	–	R: 0.06; F: 0.37 [0.57]
Model 1b	-0.007 (0.008) [0.40]	**0.0286 (0.013) [0.05]**	–	R: 0.26; F: 4.56 [0.05]
Model 2: All Countries	-23232 (15261) [0.14]	**98203 (25777) [< 0.001]**	–	R: 0.39; F: 14.51 [< 0.01]
Model 2a: All Countries	50352 (46445) [0.29]	-188811 (173630) [0.29]	**262833 (157368) [0.10]**	R: 0.46; F: 9.22 [< 0.01]
Model 3: All Countries	**5.1531 (0.315) [< 0.001]**	**2.8587 (0.532) [< 0.001]**	–	R: 0.56; F: 28.89 [< 0.01]

Notes: α stands for intercept, w_i stands for the welfare index. The coefficient estimates and their standard errors (in parentheses) are expressed in thousands. P-values are presented in square brackets. Statistically significant estimates are highlighted in bold (α = 0.10). Model 3: self-reported life satisfaction as the dependent variable, Model 2: GDP *per capita* in euro currency as the dependent variable, Model 1: average *per capita* growth (2001–2021) as the dependent variable. Model 1a for CZ, EE, HR, LV, LT, HU, PL, SI, and SK. Model 2a for BE, DK, DE, IE, GR, ES, FR, IT, LU, NL, AT, PT, FI, SE, NO, and CH.

Source: the author's own work.

CHART 1A

Welfare in 2021 and Average Real Economic Growth *per capita* (2011–2021)



Notes: The welfare indicator ranges from 0 (worst welfare) to 1 (optimal welfare). The estimated linear regression for all countries is depicted in blue, with average *per capita* growth as the dependent variable. Similarly like in Chart 1, when analysing all countries collectively, no clear pattern emerges: we failed to reject the null hypothesis of no rank correlation with Spearman's rank correlation of -0.02 (p-value = 0.92), and Kendall's rank correlation of -0.05 (p-value = 0.73).

Source: the author's own work.