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Club convergence and factors of income inequality in the European Union

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Abstract

The measurement of inequality and its determinants are major tasks within the economic literature. The main objectives of this paper are to identify patterns of convergence in the income inequality in European Union countries and to investigate the factors behind the formation of convergence clubs. For those purposes and considering the Gini index during the period 2007–2018, the club convergence approach and an ordered logit model are employed. The results show four clubs and four divergent countries. In addition, the analysis identifies certain factors, such as economic openness, public intervention and education, as the main drivers of inequality reduction. Finally, the results from the club convergence analysis for an alternative inequality measure, specifically the ratio 80:20, are similar to those achieved in the case of the Gini index.

KEYWORDS

club, convergence, European Union, Gini, inequality, ordered logit

1 | INTRODUCTION

The study of inequality is a major task in the economic literature. More specifically, behind the inequality hides one of the main market failures and one of the major reasons for the intervention of the public sector in the economy. In one of the seminal papers within this literature, Kuznets (1955) analyses the link between economic growth and inequality, concluding that inequality first increases and, later, decreases during the process of economic growth. Aghion et al. (1999) provide a theoretical framework for the mixed results achieved in the literature and, specifically, focus on the technical change in explaining wage inequality issues. Among the papers that find a positive relationship between inequality and growth are those by Li and Zo (1998), Forbes (2000), and Perugini and Martino (2008) for the case of European regions. In contrast, in an interesting survey, Neves et al. (2016) conclude that inequality has a stronger negative impact on growth in developing countries, where wealth inequality is more detrimental to growth than income inequality. Berg and Ostry (2017) study the connection between income inequality and the frailty of economic growth, concluding that longer growth spells are associated with more equality in income distribution. In addition, in another seminal contribution, Barro (2000) provides weak evidence of a relationship between income inequality and the rates of growth and investment. Madsen et al. (2018), using a large sample of OECD (Organisation for Economic Co-operation and Development) countries, spanning the period 1870–2011, argue that inequality has a weak effect on growth at advanced levels of financial development. In summary, the relationship between inequality and growth must be further

studied in light of the mixed results achieved in the literature to date.[1]

Despite the potential interrelations between inequality and economic growth and other variables – namely development, poverty, discrimination or democracy – the relevance of inequality studies in general has even increased over the last years, due to the effects of the Great Recession, and will continue with the situation generated with the current pandemic, which has had a notable impact on economic growth, as well as on inequality around the world.

The goal of this empirical work is to focus on the issue of economic convergence and its determinants. Thus, along with the seminal works of Solow (1956) and Swan (1956) on the growth convergence hypothesis, Benabou (1996) concluded that neoclassical growth models could imply the convergence of the entire distribution of income, beyond the mean, and stated that inequality will drop in countries with high inequality and increase in those with low inequality. The interest lies in the evolution of inequality in countries over time, as well as across the methods of convergence used in the literature, that is, sigma, beta, time series and club convergence; therefore, this paper employs the club convergence approach, which is able to endogenously establish clusters or clubs from panel data. Specifically, the analysis focuses on income inequality[2] in the European Union (EU) case. Among the alternative measures of income inequality,[3] it employs the Gini index, which represents the entire distribution of income. Other alternatives include the use of ratios, namely 90/10, 80/20, or the Palma ratio (Palma & Stiglitz, 2016). Thus, in order to achieve more robust results, the ratio 80:20 will also be employed.

In the general strand of the literature, few papers in inequality convergence can be found, which are described in Section 2. More specifically, only Tian et al. (2016), for the Chinese regions, and Apergis et al. (2018), for the US states, employ the club convergence approach. In addition, only Ezcurra and Pascual (2005) and Apergis et al. (2018) analyse the EU case, albeit they focus on the regional level.

Hence, this paper contributes in at least four directions. First, it analyses the EU case, which is of great interest due to economic integration[4] and the common policies adopted. Most previous studies focus on the US states, while only Ezcurra and Pascual (2005) study the EU (regions). The fundamental principle of the EU formation has been the goal of income convergence that ensures free trade and an egalitarian society. To provide further research results about income convergence in the area motivates the implementation of certain policies that will allow weak income countries to converge with strong income ones, thus making the area an attractive place to join.

Second, it employs the club convergence approach recommended by Phillips and Sul (2007), which is scarcely used in the inequality convergence literature, despite its ability to endogenously cluster the countries. The advantage of this methodological approach is that convergence is totally independent from the assumption of stationarity, while it also allows researchers to test both overall convergence and the identification of clubs across countries/regions.

Third, it uses alternative definitions of income inequality in order to provide robust evidence based on the baseline results.

Finally, it performs an ordered logit model to explore the determinants of the established clubs. In contrast to previous literature on inequality convergence, the analysis searches for the reasons/determinants a country belongs to a particular club, taking several determining factors explicitly into account. The combination of the convergence methods with the determinants of the inequality allow us to better understand this relevant topic for the European case.

The rest of the paper is organized as follows. Section 2 briefly reviews the literature on inequality convergence and its determinants. Section 3 describes the methodology of club convergence. Section 4 reports the data and the empirical results, while finally, Section 5 concludes the paper.

2 | LITERATURE REVIEW

The literature on inequality convergence is summarized in Table 1. As stated above, most papers are devoted to the US states, with little attention given to the case of the EU, despite the interest derived from economic integration and the common policies adopted. In addition, the methodologies employed in these empirical studies are often based on the beta convergence approach, as well as on time series analysis. The results provide evidence in support of convergence, although obviously each study must be analysed taking into account the territories and time period, without the possibility of directly extending results to other countries or regions. As stated above, this work contributes to filling the gap in this literature with regard to the studies on the EU and to the linkages between the clubs and the drivers of any convergence patterns.

More specifically, in terms of the US experience, Panizza (2001) uses standard OLS and GMM methods to explore income convergence across the US states. His results strongly identify the presence of convergence across all states. Ezcurra and Pascual (2009) investigate the spatial distribution of income inequality in the

TABLE 1 Summary of selected empirical papers on inequality convergence

Paper	Data	Approach	Main result
Benabou (1996)	Several samples	Beta convergence	Convergence
Panizza (2001)	US states	Beta convergence	Convergence
Ravallion (2003)	World – 66 countries	Beta convergence	Convergence
Bleaney and Nishiyama (2003)	World 1965–1990	Beta convergence	Convergence (faster among OECD countries than among developing countries)
Ezcurra and Pascual (2005)	EU regions 1993–1998	Density functions	Convergence
Gomes (2007)	Brazilian municipalities 1991, 2000	Convergence, differences among regions	Convergence (with differences by regions)
Ezcurra and Pascual (2009)	US states 1969–1999	Nonparametric	Convergence
Lin and Huang (2011)	US states 1916–2005	Beta convergence	Convergence
Lin and Huang (2012)	US states 1916–2005	Panel stationarity tests with breaks	Convergence
Ranjbar et al. (2014)	African countries 1969–2011	Panel stationarity tests with breaks	Most countries diverge from USA
Ho (2015)	US states 1916–2012	Panel unit roots in the presence of cross-section cointegration	No convergence
Tian et al. (2016)	Chinese provinces 1978–2013	Club convergence	Convergence
Apergis et al. (2018)	US states Different periods	Club convergence	Convergence and divergence
Mendonza-Velázquez et al. (2019)	Mexican states 1940–2010	Euclidian measure	Mixed results
Ivanovski et al. (2020)	Australian states 1942–2013	Unit root tests with structural breaks	Mixed results

Source: Own elaboration.

US. Their methodological approach employs a nonparametric method which examines the dynamics of the cross-sectional distribution. Their findings document the presence of convergence in income inequality across the US states. Similarly, Lin and Huang (2011) empirically test for convergence in income inequality using a panel of annual data across 48 US states. They provide strong evidence of convergence in income distribution, with their results remaining robust to the uses of alternative inequality definitions, regions, and time periods. Similar findings are provided by Ho (2015). Finally, Apergis et al. (2018) test convergence across the US states by considering different regimes, such as the Great Depression (1929–1944), the Great Compression (1945–1979), the Great Divergence (1980–present), the Great Moderation (1982–2007), and the Great Recession (2007–2009). Through the method of club convergence, recommended by Phillips and Sul (2007), they provide strong evidence that supports the convergence hypothesis only in the late 1970s and early 1980s.

In terms now of other countries/regions, such as the EU, the literature on income inequality suffers from certain limitations. On one side, this has to do with the insufficiency and criticism of the standard methodologies of sigma and beta convergence received and extensively used in the relevant references. More significantly, limitations are associated with the fact that current research has not yet offered any systematic evaluation of inequality convergence. Yin et al. (2003) explore the presence of the economic convergence of the real per capita GDP across EU Members through the mechanisms of sigma and beta convergence. Their findings provide evidence in favour of the convergence hypothesis except over the period 1980–1985, where weak divergence was identified.

Ezcurra and Pascual (2005) highlight the presence of weak convergence across EU Members, mainly due to the low levels of intradistributional mobility. Kvedaras and Cseres-Gergely (2020) evaluate not only the total, but also the inequality-affecting convergence of income distribution across EU Members. Through Monte Carlo methodological experiments they provide evidence in support of the convergence hypothesis across EU Members, especially after 2014. Overall, there is no consensus on the findings. Due to the limitations of the empirical research mentioned above, some studies provide evidence of convergence (Ben-David, 2001; Leonardi, 1995), while others support the simultaneous evidence of convergence and divergence, depending on the method used, the period considered and the countries included (Marques & Soukiazis, 1998), and still others provide irrevocable evidence of divergence (Arestis & Paliginis, 1995; Slaughter, 2001). The evidence concerning the period after the formation of the Eurozone (the post-2000 period) offers strong support to economic convergence in terms of per capita income (Kutan & Yigit, 2009; Villaverde & Maza, 2008), which is primarily attributed to the validity of the catch-up hypothesis in the growth of the weaker economies (Greece, Ireland, Portugal, Spain, and Eastern Europe). That is why this paper, steps in to provide a clearer picture concerning the convergence hypothesis by explicitly considering a more reliable methodological approach, robustness checks and an economic explanation regarding the determinants of converging or diverging patterns.

Ranjbar et al. (2014), in the case of African countries, examine stochastic convergence in real per capita income across 52 African countries, using a highly flexible stationarity test. Their findings illustrate that all African countries experience at least one break, switching between catching-up and divergence paths, while structural breaks are relevant to political instability, trade liberalization policies, and terms of trade shocks; moreover, only five of them lie on the convergence path. In the case of Chinese provinces, Tian et al. (2016) use the club convergence method and identify that provincial incomes are converging into two clubs: seven east coastal provinces towards a high-income club, while the remaining provinces are converging into a low-income club; between-club inequality is associated with investments in physical and human capital, as well as population growth rates. Mendonza-Velázquez et al. (2019) analyse the convergence patterns in inter-regional inequality and income per capita across the Mexican states. Their results indicate that Mexican states do not converge to the same long-run equilibrium and, thus, club convergence is identified for both regional inequality and income per capita, recommending that income disparities need to be specifically addressed through pro-poor regional policies. Finally, Ivanovski et al. (2020) explore stochastic income convergence across the Australian states by employing a battery of unit root tests that allow for endogenously determined structural breaks. Their findings document that in the presence of a single break, income inequality converges to a stable steady state, but under the presence of multiple breaks the convergence hypothesis is rejected. This rejection could be potentially explained by the mining boom, the transition from manufacturing to a service-based economy, changes in government welfare, and favourable changes in tax policies and superannuation.

Finally, a different strand of this literature explores the validity of the convergence hypothesis by considering world samples. More specifically, Ravallion (2003) offers evidence that within-country income inequalities have been slowly converging since the 1980s, while inequality falls (rises) in countries with initially high (low) inequality. Similarly, Bleaney and Nishiyama (2003) show that convergence differs between advanced and developing countries, with the speed of convergence being faster in advanced countries.

The study of the determining factors of inequality has attracted increasing attention in the literature over the last decades. Among these factors, it is worth noting the role of institutions (Engerman & Sokoloff, 1994) or, more specifically, the role of corruption in the growth and income inequality processes (Gupta et al., 2002). In addition, Nikoloski (2009) distinguishes economic determinants, such as natural resources, GDP or international trade, and political factors, such as democracy.[5] If the analysis is for less developed countries, the determinants will be adapted for these situations, as in Odedokun and Round (2004) for the case of African countries, which mainly takes into account the effect of public expenditure and grants, and the natural resources. Banerjee and Duflo (2003) use randomized control trial methods and identify that, in the cases of African and Indian regions, there are several factors that encourage inequalities and cause the maintenance of poor people within a poverty circle hard to break. Such factors include education, access to microcredits, the quality of the health system, and nutrition issues.

It is also interesting to note the concept of opportunity inequality (Roemer, 1993). Although this field is more recent than economic inequality, factors such as the intergenerational transmission of status or social mobility are crucial to explaining the inequality phenomenon, taking into account that the study and measurement of these factors are generally troubled. In recent studies, Aiyar and Ebeke (2020) analyse the relationship between income inequality and economic growth taking into account the intergenerational mobility in income

and education; Cabrera et al. (2021) study the inequality of opportunity in Spain, a country with high inequality and low levels of relative mobility in education and occupation, concluding that opportunity inequality represents 44% of overall inequality.

3 | METHODOLOGY

The analysis follows the club convergence approach developed by Phillips and Sul (2007, 2009). These authors propose the log*t* test to analyse convergence in a panel data set for a variable y_{it}, $i = 1, 2, ..., N$ and $t = 1, ..., T$, with N being the number of countries and T the sample size. Starting from:

$$y_{it} = b_i \mu_t + u_{it}, \tag{1}$$

where μ_t represents the common factor, b_i the idiosyncratic distance between μ_t and the systematic part of y_{it}, and u_{it} the error term, they construct a time-varying factor representation:

$$y_{it} = b_{it} \mu_t, \tag{2}$$

where μ_t, the common growth component, is a common trend function, which may have some deterministic or stochastic behaviour, and b_{it}, the transition parameter, represents the time-varying idiosyncratic loadings and measures the share of the common trend μ_t that economy i experiences. In addition, they propose the relative transition path that traces out an individual trajectory over time for economy i relative to the panel average, removing the common growth path:

$$h_{it} = \frac{y_{it}}{N^{-1} \sum_{i=1}^{N} y_{it}} = \frac{b_{it}}{N^{-1} \sum_{i=1}^{N} b_{it}}. \tag{3}$$

In the case of convergence, $h_{it} \underset{p}{\to} 1$ for all i as $t \to \infty$, and the cross-sectional mean square transition differential, H_t, converges to zero asymptotically:

$$H_t = N^{-1} \sum_{i=1}^{N} (h_{it} - 1)^2 \to 0 \text{ as } t \to \infty. \tag{4}$$

Based on the above result, they propose the log*t* convergence test. This test involves estimating the following regression by ordinary least squares with robust covariance matrix:

$$\log\left(\frac{H_1}{H_t}\right) - 2\log(\log(t)) = \mathrm{c} + b\log(t) + u_t, \tag{5}$$

for $t = [rT], [rT] + 1, ..., T$, for some fraction $r > 0$, suggesting $r = 0.3$ for $T \leq 50$, being $[rT]$ the integer part of rT. The coefficient $\widehat{b}$ provides a scaled estimator of the speed of convergence parameter α (since $\widehat{b} = 2\widehat{\alpha}$). Thus, the null of convergence can be tested by a one-sided t test of $\alpha \geq 0$ (using the estimate $\widehat{b}$), which is rejected at the 5% significance level if the t-statistic is below -1.65. In addition, the magnitude of $\widehat{b}$ is also relevant: $0 \leq \widehat{b} < 2$ (or $0 \leq \widehat{\alpha} < 1$) implies *relative convergence*, providing evidence that differentials tend to decrease over time, or convergence in growth rates; and $\widehat{b} \geq 2$ (or $\widehat{\alpha} \geq 1$) implies absolute convergence, or convergence in level. When the null hypothesis of convergence is rejected, the clusters or convergence clubs are endogenously searched for. The details of the algorithm can be found in Phillips and Sul (2007).

4 | DATA AND RESULTS

4.1 | Data

This paper analyses the inequality across the EU countries through the Gini index, spanning the period 2007–2018. This time framework has been selected because of the availability of such indexes since 2007 for most of the countries. Specifically, the analysis considers 27 countries, the EU-28 except Croatia, whose data are available only from 2010 onwards. Table 2 reports certain descriptive statistics. The unweighted average remains practically constant during the period, but the coefficient of variation, a common indicator of sigma convergence – dispersion – reveals a drop from 2007 until 2012, but then the dispersion grows to finish practically at the same level in 2018. It should be noted that the lowest and highest values of inequality are located among the New Member States (2004–), denoting a bigger inequality after the European enlargement in the 2000s.

The evolution of the coefficient of variation, or sigma convergence, is represented in Figure 1, where we can see how there is a change in this trend around 2012. In this year, there is a break, which distinguishes the aforementioned period into two subperiods. In the first, there is sigma convergence, which was facilitated after the Great Recession of 2008[6]; then, in view of the recovery, in 2012 the trend reversed, generating an increase in disparities – the absence of sigma convergence, or sigma divergence – until the present time.

TABLE 2 Descriptive statistics

	2007	2012	2018
Mean (unweighted)	29.68	29.62	29.83
SD	4.30	3.49	4.24
C.V.	0.1450	0.1179	0.1420
Min.	23.20 (Slovenia)	23.70 (Slovenia)	20.90 (Slovakia)
Max.	38.30 (Romania)	35.70 (Latvia)	39.60 (Bulgaria)
Range	15.10	12.00	18.70
N. obs.	27	27	27

Source: Eurostat and own elaboration.

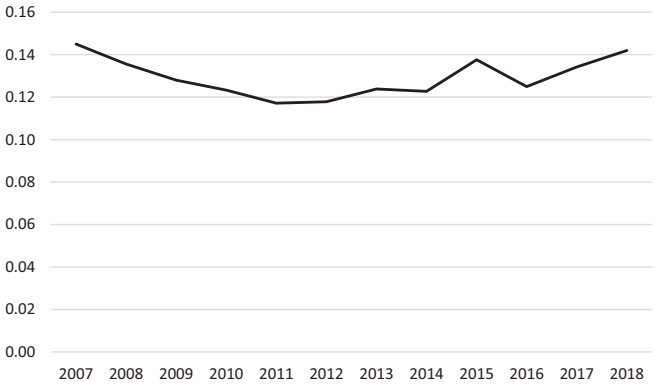

FIGURE 1 Sigma convergence of inequality. *Source*: own elaboration

4.2 | Club convergence

The results[7] are reported in Table 3. First, the log*t* test rejects the hypothesis of convergence in the entire sample, as expected after the preliminary analysis in the previous section, allowing the seeking of clusters or convergence clubs.

The results illustrate the formation of four clubs, along with four divergent countries: on the one hand, Bulgaria and Lithuania, with the highest inequality indexes; and on the other, Slovakia and Czechia, with the lowest Gini indexes. Club 1 is composed of high inequality countries, Cyprus, Estonia, Greece, Hungary, Italy, Latvia, Luxembourg, Romania and Spain; Club 2 contains Denmark, Germany, Portugal, Sweden and the UK; Club 3 includes Austria, France, Ireland, Malta, The Netherlands and Poland.; and finally, Club 4, the low inequality cluster, contains Belgium, Finland and Slovenia.

Figure 2 depicts the average inequality indexes across clubs, with the divergent countries being also represented. It can be observed that there is a higher distance among clusters in the final stage of the period, denoting clearly the absence of convergence in the entire sample. With the aim of formally exploring the determining factors of these clusters, the next step of the empirical analysis will perform an ordered logit model.

4.3 | Determinants of convergence clubs

In order to find the determinants of the clubs obtained previously, that is, the factors that affect the likelihood of any given country belonging to a particular inequality convergence group and taking into account that there are definitely also differences among the countries in each club, the plan consists of the estimation of an ordered logit model where the variable is coded as 1, 2, 3 and 4 matching the number of clubs. To consider all countries in the analysis, the strategy has included the divergent countries in one of the clubs; specifically, Bulgaria and Lithuania in Club 1, high, and Czechia and Slovakia in Club 4, low. The model is estimated over the period 2014–2018 due to the unavailability of some data. Taking into account the literature on this topic reviewed above, the analysis considers openness, unemployment, public expenditure, GDP per capita, tax burden, primary sector, education, and immigrant and rural population as explanatory variables, which are described and defined in Table 4. With regard to the expected signs, it should be taken into account that (Club) 1 corresponds to the highest inequality, while (Club) 4 indicates the lowest inequality, implying an inverse interpretation of the signs: a negative sign in the estimation is associated with a positive relationship with the inequality, and vice versa. This 'contradiction' is included in the last column of Table 4 under 'expected sign' and 'expected effect'.

The main results of the ordered logit model are reported in Table 5. All variables, except rural population, are statistically significant, and carry the expected sign. In addition, Table 6 contains the marginal effects, that is, the impact or influence of each variable on the probability of belonging to each club, that is, the effect that a one-unit change in the explanatory variable has on the probability of different discrete outcomes.

TABLE 3 Convergence club results

Club	Countries	Average[a]	Type	$t_{\widehat{b}}$	$\widehat{b}(s.e.)$	$\widehat{\alpha}$
Full sample				−143.3459[b]	−1.0957 (0.0076)	
Club 1	Cyprus, Estonia, Greece, Hungary, Italy, Latvia, Luxembourg, Romania, Spain	32.65	High	2.2633	0.2685 (0.1186)	0.1342
Club 2	Denmark, Germany, Portugal, Sweden, UK	30.20	Medium+[a]	1.0948	0.1138 (0.1039)	0.0569
Club 3	Austria, France, Ireland, Malta, Netherlands, Poland	28.51	Medium−	−0.6152	−0.0520 (0.0844)	−0.0260
Club 4	Belgium, Finland, Slovenia	25.24	Low	2.5306	0.2721 (0.1075)	0.1360
Divergence	Bulgaria	37.98	High+			
	Lithuania	36.88	High+			
	Czechia	24.74	Low−			
	Slovakia	23.64	Low−			

[a]Average over last 5 years (2014–2018).
[b]Indicates rejection of the null hypothesis of convergence at the 5% level.

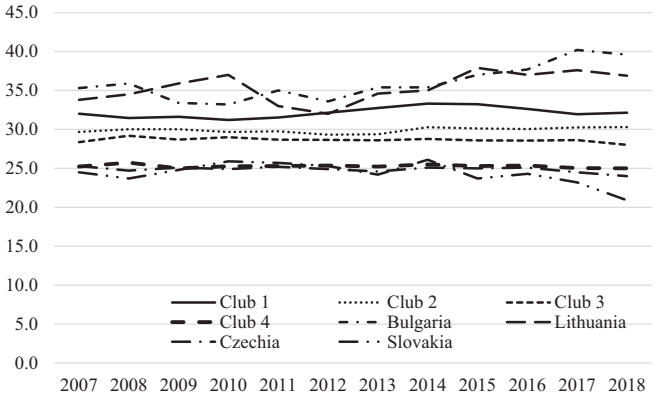

FIGURE 2 Average Gini indexes across clubs. *Source*: Own elaboration

TABLE 4 Explanatory variables

Variable	Definition	Expected sign (effect)
Openness	Exports and imports as % GDP	Positive (−)
Unemployment	Unemployment rate	Negative (+)
PublicExp	Public expenditure as % GDP	Positive (−)
GDP per capita	Gross Domestic Product per capita	Mixed
TaxBurden	Taxes as % GDP	Positive (−)
PrimarySector	Primary sector GDP as % GDP	Negative (+)
Education	Population with tertiary education as % total (15–64 years, levels 5–8)	Positive (−)
Immigrant	Immigrants as % total population	Negative (+)
Rural	Rural population as % total population	Negative (+)

Source: World Bank and Eurostat.

In the case of GDP per capita, the results indicate a positive effect (negative sign) of per capita income on inequality, in line with part of the literature discussed in the introduction. This main economic indicator reveals the heterogeneity across European countries, with extremes such as Bulgaria and Romania on one side, and Luxembourg on the other.

Regarding openness, its effect for Club 1 – highest inequality – is negative, but positive for Clubs 3 and 4 (lowest inequality), denoting that openness improvements may move the country to a lower inequality club. The great differences in economic openness across European countries should be noted. Thus, in 2018, openness ranges from 60.3% in Italy to 387.1% in Luxembourg.

By contrast, unemployment appears to have a positive impact on Club 1 and a negative one on Clubs 3 and 4, implying that lower unemployment may induce the country to belong to a lower inequality club. Objectively, unemployment data show noteworthy dissimilarities among Member States. Hence, in 2018, while Czechia has only 2.2%, the percentage rose to 19.7 in the case of Greece.

The results for public expenditure,[8] tax burden and education[9] are similar in the sense that improvements on these magnitudes diminish the probability of belonging to the highest inequality club (1) and increase the probability of being part of the lowest inequality clubs (3 and 4). With regard to public

expenditure and tax burden, the results are in line with those found by Muinelo-Gallo and Roca-Sagalés (2011); regarding education, the results support the theories that defend education as one of the main tools with which to fight inequality (Brighouse et al., 2016; Jerrim & Macmillan, 2015).

Contrary results are achieved for the cases of GDP per capita, primary sector and immigrant population. Increases in these variables increase the probability of belonging to Club 1 and reduce the likelihood of being part of Clubs 3 and 4. In addition, these last two clubs are the ones that have the greatest impact, that is, an increase of 1% in the immigrant population of a country increases, on average, the probability that it belongs to Club 1 (higher inequality) by 0.32, and decreases the probability of belonging to Club 4 (lower inequality) by 0.23. This, therefore, highlights the vulnerability of a social group, such as immigrants.

TABLE 5 Ordered logit model: Main results

Variable	Estimation
Openness	0.035543*** (0.006468)
Unemployment	−0.138861** (0.070477)
PublicExp	0.061786** (0.029300)
GDPpc	−0.000142*** (0.000030)
TaxBurden	0.173906*** (0.052609)
PrimarySector	−2.894645*** (0.445667)
Education	0.092951** (0.041151)
Immigrant	−2.604107*** (0.457020)
Rural	0.011261 (0.018390)

Note: Obs. = 135; LR χ^2 (9) = 110.50 (prob > χ^2 = 0.0000); Pseudo R^2 = 0.3035. Log likelihood: −126.8175. Standard error between parentheses.
***Significant at 1%; **Significant at 5%.
Source: Own elaboration.

4.4 | Another perspective: The ratio 80:20

As stated previously, along with the Gini index, the inequality can be addressed through several ratios. In this paper, the analysis uses the ratio 80:20, which is also available for the sample in Eurostat. Table 7 reports the convergence club results for this ratio.[10] As expected, the results are not identical to those achieved for the Gini index, as they are two different and complementary measures of income inequality. However, important similarities can be clearly observed, reinforcing the main achievements of the empirical analysis. Specifically, in the case of the ratio 80:20, the results lead to five clubs and three divergent countries: Bulgaria (high) and Czechia (low), as in the Gini case, and Belgium (low).

With the aim of combining the results from the two inequality measures, that is, Gini and ratio 80:20, Table 8 contains the summary of the clubs achieved in both cases. Under this joint perspective, two groups of countries arise in the extremes: on the one side, Bulgaria,

TABLE 6 Ordered logit model: Marginal effects

Variable	Club 1	Club 2	Club 3	Club 4
Openness	−0.00444*** (0.0006)	−0.00028 (0.0003)	0.00146*** (0.0005)	0.00326*** (0.0005)
Unemployment	0.01734** (0.0086)	0.00111 (0.0013)	−0.00569* (0.0031)	−0.01276* (0.0065)
PublicExp	−0.00771** (0.0035)	−0.00049 (0.0006)	0.00253** (0.0013)	0.00568** (0.0027)
GDPpc	0.00002*** (0.0000)	0.00001 (0.0000)	−0.000006*** (0.0000)	−0.00001*** (0.0000)
TaxBurden	−0.02171*** (0.0061)	−0.00138 (0.0016)	0.00712** (0.0029)	0.01597*** (0.0046)
PrimarySector	0.36143*** (0.0386)	0.02305 (0.0238)	−0.11858*** (0.0272)	−0.26590*** (0.0397)
Education	−0.01161** (0.0049)	−0.00074 (0.0009)	0.00381** (0.0019)	0.00854** (0.0038)
Immigrant	0.32515*** (0.0447)	0.02074 (0.0221)	−0.10668*** (0.0304)	−0.23921*** (0.0383)

Note: *** Significant at 1%; ** Significant at 5%; * Significant at 10%.
Source: Own elaboration.

TABLE 7 Convergence club results. Ratio 80:20

Club	Countries	Average[a]	Type
Full sample			
Club 1	Lithuania, Romania, Spain	6.95	High
Club 2	Estonia, Greece, Italy, Latvia	6.10	Medium+
Club 3	Cyprus, Germany, Hungary, Ireland, Luxembourg, Portugal, Sweden, UK	4.80	Medium
Club 4	Austria, Denmark, France, Malta, Netherlands, Poland	4.21	Medium−
Club 5	Finland, Slovakia, Slovenia	3.55	Low
Divergence	Bulgaria	7.50	High+
	Czechia	3.45	Low
	Belgium	3.82	Low

Source: Own elaboration.
[a]Average over last 5 years (2014–2018).

TABLE 8 Summary of convergence club results for Gini and ratio 80:20

\80:20 Gini	Div+	1. High	2. Med+	3. Med	4. Med−	5. Low	Div−
Div+	Bulgaria	Lithuania					
1. High		Romania Spain	Estonia Greece Italy Latvia	Cyprus Hungary Luxemb. Sweden UK			
2. Med+				Germany Portugal	Denmark		
3. Med−				Ireland	Austria France Malta Netherlands Poland		
4. Low						Finland Slovenia	Belgium
Div−						Slovakia	Czechia

Source: Own elaboration.

Lithuania, Romania and Spain, and on the other, Czechia, Belgium, Slovakia, Slovenia and Finland.

4.5 | Discussion

In terms of policy implications, and within the European context, the results indicate that the fight against inequality requires more aggressive policies if inequality reduction is really a major target of European policymakers. Great differences remain across European countries, despite the regional and cohesion policies developed over recent decades.[11] Moreover, as stated above in the sigma convergence analysis, although during the first years after the outbreak of the Global Financial Crisis or the Great Recession, the inequality across countries diminished, it grew again during the economic recovery, denoting the preference of the European institutions for economic growth and price stability over the issues of inequality.

The results identify factors such as openness, public intervention and education as the main drivers of inequality reduction. It is the latter variables, education in particular, that can be the key determinants when it comes to reducing inequalities, acting as social elevators and helping to improve the economic level of current and future generations, compared to their predecessors (OECD, 2018).

Moreover, inequality is a profound social problem (Stiglitz, 2013), and it is one of the major challenges, along with poverty. It should be noted that people at the risk of poverty or social exclusion in the EU represented 21.7% of the total population in 2018, ranging from 11.8% in Czechia to 38.9% in Romania.

A high and persistent inequality is regarded as undesirable because of the potential to emphasize populism and the discontent among the population and in relation to politicians, or even trigger political and social polarization conflicts. In the EU context,[12] additionally, inequality can affect the integration process (Simpson & Loveless, 2017).

The current pandemic crisis is also seriously affecting economic activity and (un)employment, with detrimental effects on inequality. The powerful intervention of the public sector during this time since the beginning of the pandemic in March 2020 is softening the impact on income and profits, but the associated high uncertainty about the vaccine process and the economic recovery, along with the high public debt generated, are expected to hamper the inequality reduction process over the next few years. Nasir (2022) discusses the challenges the EU faces in the aftermath of the COVID-19 pandemic and in terms of the integration process. In particular, given the absence of real convergence across EU Members, the author goes a step further to recommend (economic and non-economic) policies that will benefit not only real convergence, but also balanced social coherence. It should also be noted that inequality is one of the Sustainable Development Goals of the United Nations – more specifically, goal 10: reduce inequality within and among countries – and, of course, also of the EU.

5 | CONCLUSIONS

The study of inequality is a major concern in the economic literature focused on the relationship between economic growth and inequality. In addition, the convergence literature has been widely applied to economic growth and other magnitudes, but to a lesser extent to inequality. The novelties associated with this paper came through the following channels: first, it analysed the EU case, which has been of great interest due to economic integration[13] and common policies adopted. The empirical analysis employed the club convergence approach, recommended by Phillips and Sul (2007). The advantage of this methodological approach was that convergence did not depend on the stationarity of variables, and it also allowed researchers to test both overall convergence and the identification of convergence clubs across countries/regions. Third, it used alternative definitions of income inequality to provide robust evidence built on the baseline results. It also performed an ordered logit model to explore the determinants of the established clubs by taking several determinants explicitly into consideration. The combination of the convergence methods with the determinants of the inequality allowed for a better understanding of this relevant topic for the European Union case.

The results documented against inequality convergence across all EU Members. The study identified four clubs, as well as four divergent countries. It also identified that openness, unemployment, public expenditure, GDP per capita, tax burden, the primary sector, education, and immigration could significantly contribute to convergence. The empirical findings suggested an alternative definition of the inequality measure. Under the joint perspective, the analysis documented two primary diverging clubs of countries.

In terms of policy implications, the results indicate that the fight against inequality requires more ambitious policies, pointing out some of the potential drivers for that path. Given the combination of the results from convergence and the ordered logit model, they clearly support convergence across the EU as a tale of two stories. Policies have not proved sufficient enough to lead Members towards a common convergence path. The proper response to divergence paths is the implementation of policies that can eliminate diverging patterns. The results validate the role of factors like trade issues, tax policies homogeneity, and educational policies in enabling relatively lower income countries to increase their per capita income to a greater extent in comparison to the relatively higher income Members, thereby narrowing down the income gap across Members. Overall, the EU needs to reconsider not only its growth model, but also the implementation of more efficient and balanced policies across a wide spectrum of sectors, to assure long-term convergence. The evidence probably implies that faster growth is not enough to achieve real convergence, because it potentially leads to wider spatial differences. Only the application of policies that ensure more balanced growth patterns across Members can do the job. In order to properly contextualize these results, the limits related to cautions derived from the available time period should be noted. In addition, although we have considered the Gini index as the main indicator and the ratio 80:20 as a complementary index, income inequality is a very complex phenomenon which can be assessed with other approaches.

In future research, it would be interesting for the analysis to investigate the impact of the recession caused by the COVID-19 pandemic on inequality and its convergence patterns. The effects of the pandemic across countries are clearly different, and hence the impact on

inequality will not be uniform across the EU. The inequality data from 2020 onwards, unavailable for these countries at this moment, will provide new insights about the evolution of inequality and the effects of the policies deployed by the European authorities, including the Next Generation EU, a recovery plan endowed with €750 billion.

ENDNOTES

[1] In an interesting paper, Ravallion (2018) reviews inequality and globalization, which is also an open debate in this strand of the literature.

[2] Most studies are devoted to the study of income inequality. Regarding wealth inequality, there have been a number of recent papers (Islam & McGillivray, 2020; Zucman, 2019). They find that wealth inequality is negatively associated with cross-country economic growth for 45 countries in the period 2000–2012.

[3] See Kaplow (2005) for an interesting discussion about the relevance of measuring inequality.

[4] Campos et al. (2019) recently studied the growth effects of European integration. They conclude large and positive effects, except for in the case of Greece.

[5] In a recent related paper, Karakotsios et al. (2020) analyse the causal relationships between income inequality and economic freedom, concluding a positive effect from economic freedom on income inequality for a panel 58 countries during the period 1995–2016.

[6] See Fredriksen (2012) for an analysis of income inequality in the EU in the period 1985–2010, and Dunford (1994) between the 1960s and 1980s.

[7] The results have been obtained using Stata. See Du (2017) for implementing the club convergence in Stata.

[8] Turnovsky (2015) specifically studies the role of public investments on inequality, with mixed results.

[9] In a recent study, Burger (2019) analyses the social segregation in education systems in the EU, concluding the presence of problems of socioeconomic inequality. In addition, in the context of inequality and economic growth, Eicher and Garcıa-Peñalosa (2001) revise the role of human capital during the development process.

[10] More detailed results are available upon request.

[11] Boldrin and Canova (2001) analysed the European regional policies, concluding that they focused on a redistributional purpose and had little relation to fostering economic growth, but our results evidence important inequality divergences to date.

[12] Regarding the inequality in the EU, see Dauderstädt and Keltek (2011) for a discussion about the measurement and the level, which is in their opinion underestimated in the statistics.

[13] Campos et al. (2019) recently studied the growth effects of European integration. They conclude large and positive effects, except for the case of Greece.

DATA AVAILABILITY STATEMENT

Data are available from Eurostat and World Bank.

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