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RESEARCH ARTICLE

The role of political institutions in the Eurozone's economic convergence process

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Abstract

This paper investigates the nexus between per capita income convergence and political institutions within the Eurozone. Employing data spanning the years 2002–2019, the research initially identifies multiple convergence clusters and subsequently examines the relationship between the creation of these clusters and different aspects of political institutions. The findings reveal that there are multiple steady states in the Eurozone, and their formation is notably influenced by political institutions alongside other conventional economic determinants derived from the Solow model. Furthermore, the study underscores that improvements in regulatory quality, as well as in aspects such as democracy, government effectiveness, and corruption control, positively impact income convergence across all member countries. These findings carry significant policy implications.

Keywords: convergence; Eurozone; institutions; political

JEL Codes: H00; P5; O43; O47; O52

Introduction

The Economic and Monetary Union (EMU) within the European Union (EU) seeks to enhance economic integration and stability among its member states, with a primary goal of income convergence. This process aims for less developed member states to progressively approach the income levels of their more developed counterparts.

Empirical investigations into the factors influencing convergence have expanded considerably since Barro's (1991) seminal work. Subsequent studies have incorporated crucial determinants such as human capital (Mankiw *et al.*, 1992) and trade openness, which have been demonstrated to be highly relevant for economic growth (Alcalá and Ciccone, 2004). Within the existing literature, three fundamental variables – initial conditions and physical and human capital accumulation – have consistently been highlighted. Furthermore, other variables have been introduced alongside these foundational elements, considering various combinations of three among the remaining candidates.

This common empirical strategy involves including each new variable of interest one at a time, while maintaining the original model's determinants as a baseline. This approach ensures accurate inference. Additional variables considered in these studies include geography, religion, history, and political institutions (Barro, 2015; Bräuninger and Pannenberg, 2002; Feldstein *et al.*, 1992; Kufenko *et al.*, 2020; Moutinho *et al.*, 2023), demonstrating that the Solow model remains valid in its fundamental essence. Furthermore, it highlights that, depending on the countries analysed, additional factors can also serve as significant determinants of growth and, therefore, of convergence.

The so-called political institutions encompass organizational structures and processes regulating political interaction within a society (Kilishi, 2017). These institutions involve the system of government, laws, electoral procedures, civil and political rights, and other norms defining political dynamics

and the relationship between citizens and states (Acemoglu and Robinson, 2012; Bayart, 1996; North, 1990). They play a crucial role in a country's organization, stability, and safeguarding citizens' rights and freedoms. This type of institutions, although well-defined as seen, encompasses a wide range of institutional aspects that can have diverse effects on the economic development of a country.

North (1990) collectively endorses the proposition that institutions play a pivotal role in shaping a country's economic development. However, scholars such as Glaeser *et al.* (2004) contend that this relationship is not universally consistent, with poorer countries serving as an exception to the positive correlation between improved institutions and economic development. Conversely, other researchers, including Voigt (2018), Levitz and Pop-Eleches (2010), Durlauf *et al.* (2001), and Beyaert *et al.* (2023), argue that political institutions not only influence the state–individual relationship but also impact a nation's economic structure and long-term growth.

In addition to these perspectives, Lauth (2015) enhances the discourse by emphasizing the necessity of studying the relationship between political institutions and economic development. Recognizing this influence, it becomes apparent that political institutions could significantly shape the economic performance landscape of a country, thereby influencing the economic convergence process among different groups of nations.

The notion of economic convergence encompasses a broad spectrum, ranging from an absolute 'catching-up' process to conditional convergence, which explores whether countries, despite disparate income levels, share a common steady state. Traditionally, a β-convergence approach has been employed to study this process. Empirically, this involves estimating a growth equation following the theoretical framework of the Solow model. Later approaches introduced the concept of stochastic convergence, positing that if differences in the levels of an economic variable, such as per capita income, follow a stationary stochastic process, then any deviation from the mean tends to be temporary. This implies that, in the long run, economies will converge towards a common average level, although the path to this convergence is subject to fluctuations. Evans and Karras (1996) proposed the use of unit root tests to examine this hypothesis.

More recently, cluster analysis has emerged to detect whether there are groups of economies that share a common long-term path and thus converge among themselves, but not with those forming other subgroups. This study specifically focuses on the latter perspective due to its advantages over previous methodologies. The advanced convergence test models heterogeneous behaviour using a common factor and idiosyncratic effects, allowing for the differentiation among various convergence types and the identification of convergence clusters and low-income traps, all endogenously and within a single procedure (Pesaran and Smith, 1995).

This paper investigates the interplay between income convergence and political institutions within the Eurozone from 2002 to 2019. Utilizing the Phillips and Sul log-t test, refined by Lyncker and Thoennessen (2017), it identifies convergence clusters, indicating multiple steady states in GDP per capita. The methodology employs panel data analysis with various algorithms to detect clusters of countries exhibiting convergence, modelling short- and long-term behaviours to assess whether heterogeneity diminishes over time. The primary objective is to scrutinize the impact of political institutions on the economic convergence process, distinguishing between regulatory aspects and norms governing economies, and the effects of anti-corruption behaviours, bureaucracy, and democratic quality within Eurozone members.

Panel estimations with ordered dependent variables are used to understand how traditional determinants of the Solow model, augmented with political institutions, influence the formation of multiple steady states within the Euro area. The identification of distinct convergence cluster suggests the absence of convergence, with specific countries converging among themselves. Conditioned kernel distributions and high-density regions (HDRs) unravel the relationship between political institutions and per capita income within each club, determining whether improvements in political systems can enable countries to conditionally converge with higher-income states.

The findings demonstrate the significant influence of various aspects of political institutions on the observed lack of convergence, alongside other conventional factors. The internal dynamics between

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political institutions and income within each convergence cluster reveal a positive correlation, suggesting that enhanced political institutions are linked to higher-income levels.

To achieve convergence to higher per capita income levels, less advantaged countries must improve both their regulatory quality and other institutional aspects related to historical aspects and agent behaviour, such as democratic quality, bureaucratic effectiveness, and corruption control. This is crucial for peripheral countries, which are caught in an institutional trap where poor democratic quality, weak anti-corruption efforts, and ineffective governance lead to divergence from wealthier Eurozone members.

The evidence highlights the necessity for member states to enhance their regulatory and judicial frameworks, as well as other idiosyncratic aspects of their political institutions. European authorities should promote reforms through targeted policies to reduce per capita income disparities among member states.

The structure of the paper is as follows: in section 'Literature review', a brief review of the literature is made; in section 'Measuring income convergence within the Euro area', the results on economic convergence are shown. In section 'Factors influencing the formation of income convergence clubs', the impact of political institutions on the formation of multiple steady states within the Eurozone is analysed. Then, in section 'Concluding remarks', the results are discussed and some concluding remarks are presented.

Literature review

The convergence of per capita income levels across member states has not been fully achieved within the EMU. Many papers using a traditional approach estimating a growth equation have detected this lack of convergence. For example, Díaz del Hoyo *et al.* (2017), Miron *et al.* (2022), and Petrović and Gligorić Matić (2023) indicate, with this approach, that while some newer member states have experienced real income convergence towards the EMU average, older member states have not observed similar trends. Specifically, certain peripheral countries have witnessed a decline in their relative economic performance compared to the EMU average. In the same vein, Cavenaile and Dubois (2011) also highlight significant heterogeneity in convergence processes within the EU and the EMU noting diverse patterns of income convergence between Central and Eastern European (CEE) countries and Western EU countries.

The identification of multiple steady states is closely related to conditional convergence, which involves recognizing groups of countries that share a common steady state, thus providing insights into the dynamics of economic growth. Studies by Bartkowska and Riedl (2012) and Lyncker and Thoennessen (2017) explore multiple steady states across EU regions, using the detection of convergence clusters specific to the EU rather than the EMU. They employ ordered logit models to demonstrate that this lack of convergence is linked to structural and idiosyncratic factors such as initial conditions and human capital. The present study adopts a similar approach but focusing on the EMU and highlighting the role of institutions as a crucial factor for convergence among member states.

Acemoglu *et al.* (2001) demonstrate the roots of institutional differences between countries and their positive relationship with development. On their side, Easterly and Levine (2002) demonstrate that capital accumulation, particularly physical capital and other traditional determinants of development, have ceased to play a fundamental role in explaining economic growth in countries. North (1990) emphasizes institutions as a source of growth, and later, Glaeser *et al.* (2004) empirically show how traditional economic growth factors such as the accumulation of fixed and human capital are closely related to a country's institutional quality. Therefore, these institutions contribute to a country's development, particularly aiding less developed countries, which subsequently improve their political institutions.

Acemoglu and Robinson (2008) later emphasize the important role that institutions have on economic growth, stressing that this impact is that of institutions in a broad sense. There are also studies that have examined the relationship between economic development and institutional quality

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in the context of Europe, such as the work of Tylecote (2016) concludes that institutions and economic development have historically been closely linked in Europe, emphasizing the need for improved institutions to achieve better economic performance within the EMU.

The link between economic development and institutional quality is well-established, suggesting that institutions significantly impact income convergence. Theoretically, Blackburn *et al.* (2006) demonstrate a connection between economic and institutional convergence. Empirical studies by Keefer and Knack (1997) highlight the critical role of institutions in promoting convergence among economically diverse nations. Similarly, Knack and Keefer (1995) and Knack (1996) find a positive relationship between institutional quality and income convergence. Savoia and Sen (2016) and Harger*et al.* (2017) directly observe the beneficial effects of institutions on convergence across countries using traditional growth equations.

Kar *et al.* (2019) emphasize the robust relationship between institutions and income through cluster methodology, although they do not specifically study the EMU, noting that poor institutional quality hinders GDP per capita growth and impedes convergence. Focusing on Europe, Boltho (2020) attributes the superior convergence of CEE countries to higher institutional quality and strong political commitment to economic alignment with wealthier economies. Unlike Boltho's traditional β−convergence and descriptive analysis, this study employs more advanced techniques to improve upon these methodologies.

Barry (2003) highlights the persistent divergence between core and peripheral Eurozone countries, attributing this to macroeconomic imbalances and institutional asymmetries. Similarly, García-Solanes *et al.* (2021, 2023) identify distinct institutional clubs within the EMU using the Phillips and Sul (2007) methodology. Their cross-correlation analysis reveals that institutional divergence, separately in regulatory quality and corruption within the Eurozone, is positively associated with potential GDP per capita growth.

Glawe and Wagner (2021) highlight the existence of institutional convergence clubs that contribute to income divergences within the EU. Their strategy involves identifying institutional convergence clubs, while this work focuses on detecting economic convergence clubs and the factors that form these steady states, incorporating institutions to understand their role. The results show that institutional clubs are influenced by geography, institutions and human capital, with poverty traps. In the present study, however, economic convergence clubs are detected and the findings demonstrate that both traditional factors and institutions lead the formation of multiple steady states, and it is found that poverty traps are directly related to institutional aspects.

In addition to the previously mentioned works, Jellema and Roland (2011) demonstrate that institutional aspects affect convergence differently: while democratic quality significantly influences long-term growth, the legal system does not. The present paper provides new insights into this existing body of research, using a different approach and identifying regulatory quality, democracy, and governmental effectiveness as crucial factors in creating different steady states, consistent with findings by Roland (2004) and Tabellini (2008, 2010).

Understanding the impact of political institutions on economic growth and convergence is crucial, especially within the Euro area where these goals are fundamental. A thorough examination of this relationship within the EMU framework is essential to assess the current position and identify necessary measures to achieve foundational economic objectives.

Measuring income convergence within the Euro area

To achieve the main objective, various methods are employed. Firstly, I analyse the convergence and potential formation of different steady states within the EMU using the Phillips and Sul tests (2007, 2009).

The Phillips and Sul's approach involves modelling cross-sectional heterogeneity in panel data by considering a common factor (long-term trend $[\mu_t]$) and idiosyncratic effects (short-run cross-sectional heterogeneity $[\alpha_{it}]$). The key equation captures the evolution of the variables in relation to

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the common factor and individual-specific elements and it is represented as:

$$X_{it} = \alpha_{it}\mu_t + \varepsilon_{it} = \left(\alpha_{it} + \frac{\varepsilon_{it}}{\mu_t}\right)\mu_t = \beta_{it}\mu_t \tag{1}$$

Model (1) defines the term β_{it} as the distance of country i from the common factor. If β_{it} tends to the same constant for all countries in the panel, it suggests that these countries are converging. However, neither β_{it} nor μ_t are observable. To address this issue, the authors suggest using the relative distance of each country from a common mean.

To develop a procedure for testing convergence that takes into account the possibility of convergence subgroups, it is necessary to assume a specific structure for the loading coefficients β_{it}. Phillips and Sul (2007) chose a specification for this structure:

$$\beta_{it} = \beta_i + \frac{\sigma_i \epsilon_{it}}{L(t)t^b} \tag{2}$$

This specification includes the parameter β_i, which represents the value that β_{it} would reach in the long run. It also includes an idiosyncratic scaling parameter called σ_i and a slow function of time called $L(t)$, such as the logarithmic function $\log(t)$. The parameter b represents the rate at which panel heterogeneity decays.

The null hypothesis and the two forms of the alternative hypothesis are:

$$H_0: \beta_i = \beta \quad \forall\, i \text{ and } b \geq 0$$

$$H_A: \quad \begin{array}{l} 1.\ \beta_i \neq \beta \quad \forall\, i \text{ or } b < 0 \\ 2.\ \ \beta_i \neq \beta \quad \text{for some } i, \text{ and } b \geq 0 \end{array}$$

If the null hypothesis is not rejected, it implies global convergence for all panel members. Acceptance of the first alternative hypothesis suggests absolute divergence, while acceptance of the second alternative hypothesis indicates the existence of convergence clusters. Phillips and Sul (2007) illustrate that the culmination of their methodology leads to a practical regression model, which serves as a means to effectively test for convergence:

$$[\log(H_1/H_t) - 2\log(\log(t+1))] = \hat{p} + \hat{q}\log(t) + \hat{u}_t \tag{3}$$

$$\text{for } t = [rT],\ [rT]+1,\ \ldots.,\ T$$

where H_t is the cross-section variance of the relative distance of each country from a common mean. In this model, the $\log(t)$ regression is represented by the fitted coefficient $\hat{q}$, which equals 2 times the estimated decay parameter $\hat{b}$. The estimation starts at time $t = [rT]$, where r is a value between 0 and 1, and T is an integer.

The null hypothesis is tested using a robust t-statistic, known as the '*log-t statistic*', which accounts for heteroscedasticity and autocorrelation. If the resulting $t_{\hat{q}}$ is less than -1.65, the null hypothesis of convergence is rejected at a 5% significance level. In cases where the null hypothesis of absolute convergence is not accepted, the next step involves determining the existence of convergence clusters. To address this, Phillips and Sul (2007, 2009) have introduced a four-stage clustering algorithm. These four stages are:

1. Initially, countries are ranked based on the descending order of the variable X_{it} at the end of the sample period.

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2. The 'central convergence club' is determined by selecting the top two countries and testing their convergence. If successful, more countries are added until convergence is rejected. The central convergence club is defined as the subgroup with the highest log-t statistic. If the initial two countries do not converge, the process restarts with the second country.
3. The remaining countries are added one by one to the central club, and the log-t test is applied to the expanded group. Countries with $t_{\hat{q}}$ greater than a specified threshold 'c' form a subgroup. If the log-t test on the central convergence club combined with the subgroup yields $t_{\hat{q}} < -1.65$, all subgroup members are added to the central convergence club. Otherwise, the critical value 'c' is increased, and the process is repeated.
4. A group is formed with countries not part of the central club. The log-t test is applied to determine if they constitute another convergence club. If this cannot be established, the algorithm is iterated to explore subgroups within this remaining group. The absence of detected subgroups or the exclusion of countries implies divergence for those outside the convergence clusters.

Following the identification of diverse clusters through the outlined process, a merging stage is introduced to potentially amalgamate subgroups into more extensive groups. The objective of merging is to diminish the count of convergence clusters, indicating that the group of countries initially labelled as divergent may no longer exhibit divergence concerning the newly recognized clusters. To facilitate this, the approach devised by Lyncker and Thoennessen (2017) is applied. This approach consists of two algorithms: one applies the log-t test to convergence clusters, and the other to diverging countries. These algorithms compare each log-t statistic with that of adjacent groups or countries, determining whether to merge convergence clusters or diverging countries based on specific rules and thresholds.[1]

The results obtained after applying this procedure to the GDPpc data of the Euro area countries are displayed in Tables 1 and 2, demonstrating that, within the Eurozone, countries share distinct steady states. Data on GDP per capita at constant prices are sourced from the World Bank, and post-2020 data are excluded to prevent distortions arising from pandemic effects.

According to the results presented in Table 1, convergence in GDP per capita for all Eurozone countries is strongly rejected by the log t-test, as the log-t statistic is significantly below -1.645. In contrast, three convergence clusters have been detected (Table 2).

As it can be seen in Table 2, the first convergence cluster is formed by Luxembourg and Ireland. The second cluster is made of Finland, Germany, Austria, Belgium, and France. Finally, the third cluster is composed of Italy, Spain, Cyprus, Malta, Slovenia, Portugal, Slovak Republic, Estonia, Lithuania, Greece, and Latvia. The Netherlands is an exception and cannot be grouped with any other countries of the EMU in terms of income convergence.

All Eurozone members belonging to any of the three detected clusters converge conditionally, meaning they share a steady state with other countries within the same club but not with those in other clubs. This highlights that within the Eurozone, multiple steady states exist, and each group of countries follows its own long-term trajectory, thereby avoiding a process of conditional convergence among all of them in the Solow style.

If these developments are observed as the per capita GDP average of each group, it can be seen that the differences between them are significant, especially between club 1 consisting of Luxembourg and Ireland, the wealthiest, and the peripheral countries, predominantly from the southern and eastern regions of the Eurozone, which converge among themselves at lower income levels. Figure 1 illustrates these results.

The depicted Figure 1 unequivocally illustrates distinct income levels among the three economic convergence clusters. The results affirm that convergence in GDP per capita within the EMU occurs in different steady states. Luxembourg and Ireland, forming club 1, consistently exhibit an average income equal to or exceeding €80,000 throughout the entire period, differentiating themselves from other wealthier Eurozone core countries (club 2) with an average income around €40,000. Finland,

[1]See Lyncker and Thoennessen (2017) for details.

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Table 1. Log(*t*) test for per capita GDP (2017 US$ constant prices)

	Estimated coefficient $\hat{q}$	Log-*t* statistic	Stand. error	*P*-value
Whole Eurozone group	−0. 782	−18.721	0.005	0.0000

Period: 2002–2019.

France, Austria, Germany, Belgium, along with the Netherlands (divergent) and Luxembourg (club 1), constitute the group of the wealthiest countries in the Eurozone. Although Luxembourg and Ireland maintain their own steady state and higher levels of wealth, separating from other wealthy countries in club 2.

On the other hand, the Southern countries, along with the peripheral nations Malta and Cyprus, and countries influenced by the Soviet bloc, consistently exhibit lower per capita income. These results indicate a shared common steady state distinct from the wealthiest Eurozone countries, highlighting not only the absence of economic convergence among Eurozone members but also different long-term evolutions.

Referencing the Solow model for empirical analysis of the long-term factors affecting a country's steady state, it becomes possible to identify determinants influencing Eurozone members. This knowledge is essential for guiding policies within the EMU. Among these factors, political institutions emerge as particularly relevant to a country's economic structure and long-term performance.

Factors influencing the formation of income convergence clubs

The methodology employed by Phillips and Sul (2007, 2009) clusters countries based on their long-run evolution path; however, it lacks an explanatory framework for the determinants behind the observed existence of multiple steady states within the Eurozone. To address this limitation, this study adopts the two-step procedure proposed by Bartkowska and Riedl (2012) and Lyncker and Thoennessen (2017). This approach involves first identifying clusters within the sample and subsequently applying an ordered logit model to discern the variables driving the formation of these clusters.

The cluster convergence hypothesis posits that the initial conditions significantly influence the income distribution of an economy. In contrast, conditional convergence studies suggest that structural characteristics, such as institutions, play a pivotal role in determining the long-run growth path, irrespective of initial conditions. Building on these theoretical considerations, this study incorporates both initial conditions and structural characteristics as variables in the regression equation to elucidate the determinants of clustering. To identify the factors influencing the formation of economic convergence clubs, leading to distinct steady states within the Eurozone, an ordinal logistic panel regression is conducted, aligning with the methodology employed by Bartkowska and Riedl (2012)

Table 2. Convergence clusters in per capita GDP (2017 US$ constant prices)

	Countries	Estimated coefficient $\hat{q}$	Log-*t* statistic	Stand. error
Club 1	Luxembourg and Ireland	0.614	1.612	0.381
Club 2	Finland, Germany, Austria, Belgium, and France	0.199	1.949	0.102
Club 3	Italy, Spain, Cyprus, Malta, Slovenia, Portugal, Slovak Republic, Estonia, Lithuania, Greece, and Latvia	0.071	0.625	0.114
Divergents	The Netherlands			

Period: 2002–2019.

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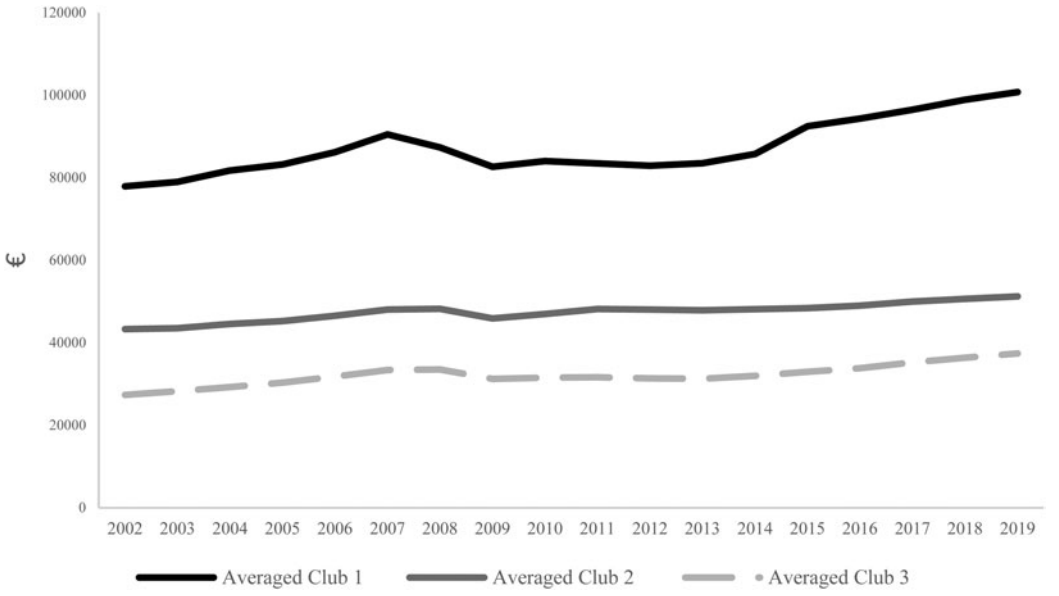

Figure 1. Averaged per capita GDP (2017 US$ constant prices). Period: 2002–2019.
Source: World Bank

and Lyncker and Thoennessen (2017) but improved by using GMM. The estimated panel equations with categorical dependent variables are as follows:

$$d_{it} = \alpha + \beta_1 GDPpc_{i,2002} + \beta_2 investment_{it} + \beta_3 population_{it} + \beta_4 SSEnrollment_{it} + \beta_5 Trade_{it} + \beta_6 LRQI_{it} + u_{it} \quad (4)$$

$$d_{it} = \alpha + \beta_1 GDPpc_{i,2002} + \beta_2 investment_{it} + \beta_3 population_{it} + \beta_4 SSEnrollment_{it} + \beta_5 Trade_{it} + \beta_6 DPSI_{it} + \varepsilon_{it} \quad (5)$$

where d_{it} is an ordinal categorical variable that takes the value 1 if country is classified in club 1, 2 in club 2,…., n in club n. This implies that the negative sign of each determinant indicates that improvements in these factors reduce the probability of belonging to a higher-order (poorer) club. In other words, a negative sign suggests that enhancements in these drivers increase the likelihood of converging and sharing a steady state with wealthier countries. $GDPpc_{i,2002}$ is per capita GDP (US$ constant, 2017) in country i at the beginning of the period. $investment_{it}$ is investment measured by gross capital formation as a percentage of GDP in country i at time t. $population_{it}$ is the number of inhabitants in country i at time t. For its part, $SSEnrollment_{it}$ is the percentage of pupils enrolled in secondary school in country i at time t, as a proxy of human capital. $Trade_{it}$ is trade openness also in country i at time t. All these variables are extracted from the World Bank. Finally, u_{it} and ε_{it} are the error terms.

A significant contribution of this paper lies in its nuanced examination of two distinct aspects of political institutional quality and their influence on the emergence of multiple steady states within the EMU. One aspect focuses on institutional political quality related to regulatory quality, the normative framework, and the government's capacity to maintain power. These factors are crucial for ensuring social cohesion, fostering investment, and creating an economic environment that enhances citizens' quality of life. The other aspect pertains to policy implementation, provision of public goods, and

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democratic quality, highlighting politicians' ability to directly improve citizens' welfare by providing rights and quality services without imposing excessive burdens on taxpayers.

Despite the close relationship between these two aspects of political institutions (Hodgson, 2015), Lauth (2015) emphasizes the importance of studying both variables, asserting their integral roles within the political system and their intrinsic connection. In line with this conceptual framework, this study employs composite indicators of different aspects of political institutional quality, a methodology previously utilized by García-Solanes *et al.* (2021, 2023).

The Legal and Regulatory Quality Index ($LRQI_{it}$) is computed as the mean of three World Bank indicators (WGI) that pertain to Rule of Law, Political Stability, and Regulatory Quality for the period spanning 2002–2019. Meanwhile, the Democracy and Public Services Index ($DPSI_{it}$) is obtained from the average of three indicators, namely Control of Corruption, Voice and Accountability, and Government Effectiveness, sourced from the same WGI and covering the same time period. To mitigate potential issues of multicollinearity in the estimation process, these two variables are examined separately in distinct models.

One of the primary innovations of this study is the estimation of models (4) and (5). Both aspects of political institutions can potentially be endogenous, and thus, traditional maximum likelihood estimation would be inconsistent (Glaeser et al, 2004). To address it effectively, I employ a Generalized Method of Moments (GMM) estimator, which is adept at mitigating biases that may stem from endogeneity concerns. Unlike conventional regression methods, GMM leverages instrumental variables and moment conditions to manage endogeneity issues, in fact it is a generalization of the instrumental variables method. GMM is particularly well-suited for addressing endogeneity concerns by utilizing instrumental variables and moment conditions, which improves the accuracy of estimates. Potential biases can arise if instruments are poorly chosen or if the sample size is small. However, in this study, the sample size is sufficient, and the selected instrument is widely accepted. Empirical findings substantiate these claims, underscoring the suitability of GMM. This estimator not only enhances efficiency but also ensures consistency in estimation results.

According to Wooldridge (2002), the GMM estimation method imposes no restrictions on the dependent variable, making it suitable for categorical variables. Additionally, Clarke and Windmeijer (2010) highlight that using this estimator with such dependent variables is a viable option, albeit with the caveat that the estimated coefficients correspond to log-odd ratios and should be interpreted as such. Therefore, this estimator is well-suited for this case if an appropriate instrument for both institutional indicators is found.

This study introduces a novel approach by incorporating Gründler and Potrafke (2019)'s corruption instrument, subsequently utilized by the authors themselves and others like Beyaert *et al.* (2023), which can be applied in our case for both indicators. Following the approach of Gründler and Potrafke (2019), the instrument is derived from jack-knifed regional averages of both aspects of political institutions corresponding to each country. In accordance with the methodology proposed by these researchers, each continent $\mathcal{R}$ is partitioned into four distinct regions denoted as $r \in \mathcal{R}$, the classification of regions comes from Gründler and Krieger (2016). The instrumental variable is formally expressed as follows:

$$\hat{I}_{it} = \frac{1}{N_{rt} - 1} \sum_{\{j \neq i | r' = r, r' \in \mathcal{R}\}} I_{jt} \tag{6}$$

where N_{rt} is the number of countries that belong to each region r at time t and I_{jt} is one of two composite indicator, $LRQI_{it}$ and $DPSI_{it}$ in j, at time t. The present study establishes the validity of the instrument through rigorous testing conducted by the researchers.

The findings underscore the impact of political institutions, viewed through a political lens, as first-order determinants – alongside traditional factors – in shaping the diverse steady states within

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the Eurozone. This substantiates the rationale for conducting an analysis by estimating equations (4) and (5). The results are presented in Table 3.

Table 3 demonstrates that both dimensions of political institutions adversely affect the formation of three convergence clubs. These clubs are ranked 1, 2, and 3, with club 3 comprising the lowest per capita income levels. The negative coefficients indicate that improvements in both political dimensions decrease the probability of being in the wealthier clubs. This negative relationship extends to initial conditions, investment, population, and human capital, implying that higher levels of physical and human capital and trade along with population growth reduce the likelihood of being in the poorer clubs, consistent with the predictions of the Solow model.

In particular, the results indicate that a 1% increase in human capital is associated with an approximately 50% reduction in the probability of belonging to lower-income clubs. Similarly, higher initial conditions result in around a 50% reduction in the probability of sharing a steady state with less affluent Eurozone countries. $LRQI_{it}$ also play a significant role; an increase of one unit in the legal-based indicator corresponds to a 27.4% probability of not belonging to the most disadvantaged group.

Conversely, when incorporating the Democracy and Public Services Index, probabilities associated with GDP per capita in 2002 and human capital remain unchanged. However, investment and trade openness, now significant, are associated with around a 50% reduction in the probability of belonging

Table 3. Ordered logit estimation by GMM for the Eurozone

	Coefficient	Std. error	*P*-values
$LRQI_{it}$	−0.975***	0.136	0.000
GDP_{2002}	-1.77×10^{-5}***	1.79×10^{-6}	0.000
$Investment_{it}$	−0.008*	0.005	0.078
$Population_{it}$	-2.96×10^{-9}***	8.87×10^{-10}	0.001
$SSEnrollment_{it}$	−0.005***	0.001	0.000
$Trade_{it}$	8.69×10^{-5}	0.0003	0.796
α	4.778***	0.153	0.000
Adjusted R^2	0.798		
J-statistic (P-value)	0.980		
$N = 342$			
	Coefficient	Std. error	*P*-values
$DPSI_{it}$	−0.978***	0.148	0.000
GDP_{2002}	-1.33×10^{-5}***	2.53×10^{-6}	0.000
$Investment_{it}$	−0.009*	0.005	0.086
$Population_{it}$	-1.35×10^{-9}	9.60×10^{-10}	0.161
$SSEnrollment_{it}$	−0.0003	0.002	0.847
$Trade_{it}$	−0.0009**	0.0003	0.009
α	4.365***	0.175	0.000
Adjusted R^2	0.752		
J-statistic (P-value)	0.998		
$N = 342$			

Period 2002–2019.
***, **, * denote statistical significance at the 1%, 5%, and 10%, respectively.

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to less favoured clubs. An increase of one unit in this political quality indicator decreases the probability of belonging to the less affluent group by 27%.

In summary, the Eurozone exhibits multiple steady states, indicating a lack of convergence among member states. The traditional determinants of growth in the Solow model are shown to influence the formation of these steady states in a consistent manner. Additionally, political institutions play a significant role in shaping these long-term evolutionary paths. Regulatory frameworks that favour membership in wealthier groups reduce the impact of trade openness on these processes. Moreover, the quality of democracy and governmental effectiveness also facilitates membership in wealthier clubs, effectively replacing human capital as the primary driver of wealth among member states.

These findings underscore the need for policymakers to focus on specific areas to address income disparities and facilitate economic convergence with leading Eurozone economies like Luxembourg and Ireland. To create an environment conducive to private investment and efficient public services, policymakers must strengthen legislative frameworks, democratic quality, government effectiveness, and anti-corruption efforts. Enhancing democratic institutions and combating corruption are essential for effective governance. These measures should be implemented at both European and national levels to improve the overall welfare of Eurozone citizens.

Unravelling the interplay of political institutions and per capita income within each club

The findings indicate the presence of multiple steady states within the Eurozone, contradicting the notion of economic convergence among its members. To thoroughly understand the interplay between income and political institutions, it is essential to examine these relationships within the identified clubs. Analysing the internal dynamics of these clubs is crucial for assessing the potential for upward mobility in countries within clubs 2 and 3. If successful, it suggests that European authorities could implement targeted policies to enhance the political landscape in specific member states, promoting convergence with higher income levels members.

To address this objective, I estimated the conditional distributions between per capita GDP and two indicators of political institutions for each identified convergence club. These distributions are presented using two types of visualizations: conditional kernel distributions and bivariate HDRs.

The conditional kernel distributions (left-side figures) illustrate distinct clusters of countries within each club, characterized by varying levels of political institutional quality. A leftward shift in the distribution indicates countries with higher income levels and better political institutions, while a rightward shift indicates the opposite.

The bivariate HDRs (right-side figures) complement the kernel distributions by showing, through dots, the multimodal nature of the conditional distribution, indicating the presence of subgroups. The rectangular areas highlight regions with high densities of countries. Areas on the left and below represent countries with lower income levels and poor political institutional quality, whereas areas on the right and above indicate countries with higher GDP per capita and superior political institutions. The darker the areas on the grey scale, the higher the density of countries with these characteristics.

If the conditional kernel distribution and HDR exhibit a single mode, it indicates the absence of internal clusters with differing levels of political institutional quality and income within the club, suggesting that improved institutions may not necessarily correlate with enhanced economic performance. Conversely, if multiple modes and internal clusters are detected, it signifies that countries with varying levels of institutional quality also exhibit diverse levels of income. This underscores the critical role of political institutional quality in determining income levels within the club. Therefore, significant potential exists for further improvements in institutional quality to achieve greater economic convergence and align more closely with wealthier countries.

Figures 2a and 2b exhibit the relationship between two aspects of institutional quality and income per capita in Club 1. While Figure 2a presents the conditional kernel distribution between GDPpc and *LRQI* for club 1, Figure 2b shows HDR conditional densities also for the same club.

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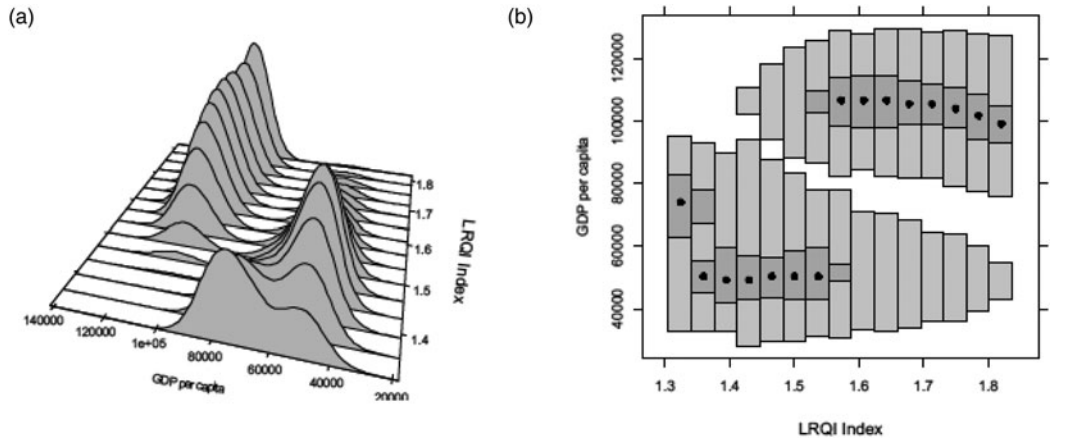

Figure 2. (a) Conditional kernel distribution between GDPpc and LRQI for club 1. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and LRQI for club 1. Period: 2002–2019.

Figures 2a–3b reveal two distinct sub-clubs within club 1, differentiated by levels of political institutional quality. Ireland shows lower income levels and room for institutional improvement. In contrast, Luxembourg boasts higher income levels and superior institutional quality. This suggests that improving Ireland's political institutional quality could boost its income, aligning it more closely with Luxembourg, a benchmark within the Eurozone (Butkiewicz and Yanikkaya, 2006).

Similarly, Figures 4a–5b present the analysis for club 2, consisting primarily of affluent core EMU countries with strong political institutional quality. The findings mirror those of club 1, showing that within club 2, higher institutional quality correlates with higher per capita income levels.

In club 2, a positive relationship between higher regulatory quality and higher income levels is evident. Enhancing the normative framework in Austria, Belgium, Finland, France, and Germany could result in long-term income increases, promoting convergence with higher GDP per capita countries in club 1. Furthermore, the conditional distribution in club 2 is multimodal, identifying three distinct groups based on institutional quality and income levels.

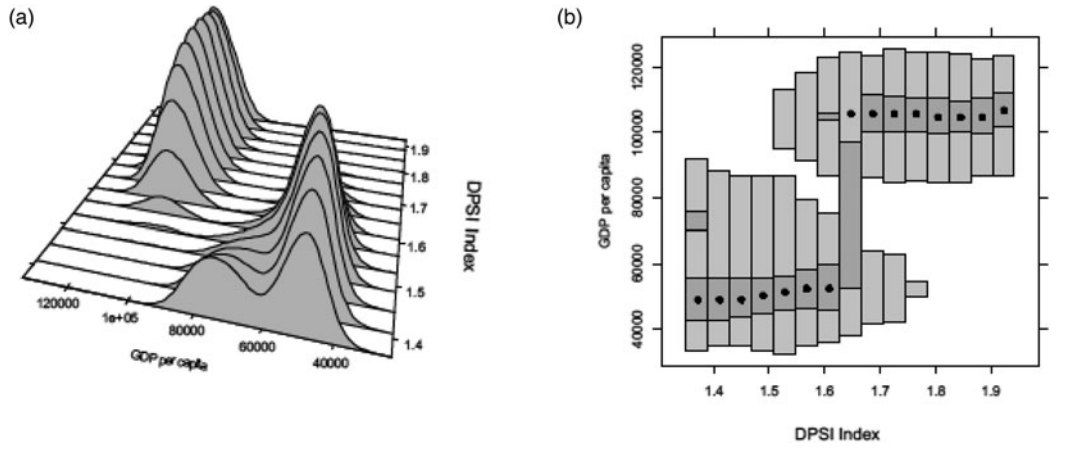

Figure 3. (a) Conditional kernel distribution between GDPpc and DPSI for club 1. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and DPSI for club 1. Period: 2002–2019.

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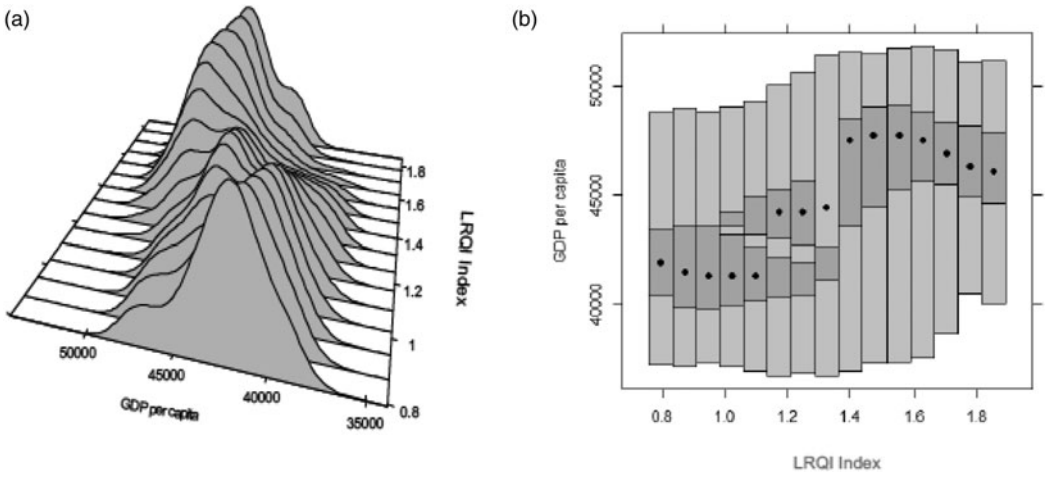

Figure 4. (a) Conditional kernel distribution between GDPpc and LRQI for club 2. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and LRQI for club 2. Period: 2002–2019.

While differences in democracy and government effectiveness are less pronounced than in regulatory quality, they significantly impact both the cluster's formation and the potential for achieving higher well-being levels. These findings suggest that these EMU countries could benefit from institutional improvements, particularly in their legal and judicial frameworks. Such enhancements could potentially facilitate convergence with Luxembourg and Ireland (Figures 2–3).

Upon analysing the conditional distributions of both indicators and per capita income for club 3, evidence of disparities among member countries in terms of their legal frameworks is found (Figure 6). This pattern differs from other clubs, revealing a group of countries with a better regulatory framework but lower income levels.

Specifically, countries with an $LRQI_{it}$ exceeding 0.5 exhibit a per capita income of approximately 20,000 euros or less, while those below this threshold surpass 20,000 euros. This demonstrates that improvements in regulatory quality are not necessarily associated with higher per capita income. Additionally, the results for the $DPSI_{it}$ indicate that club 3 is in a distinct situation compared to

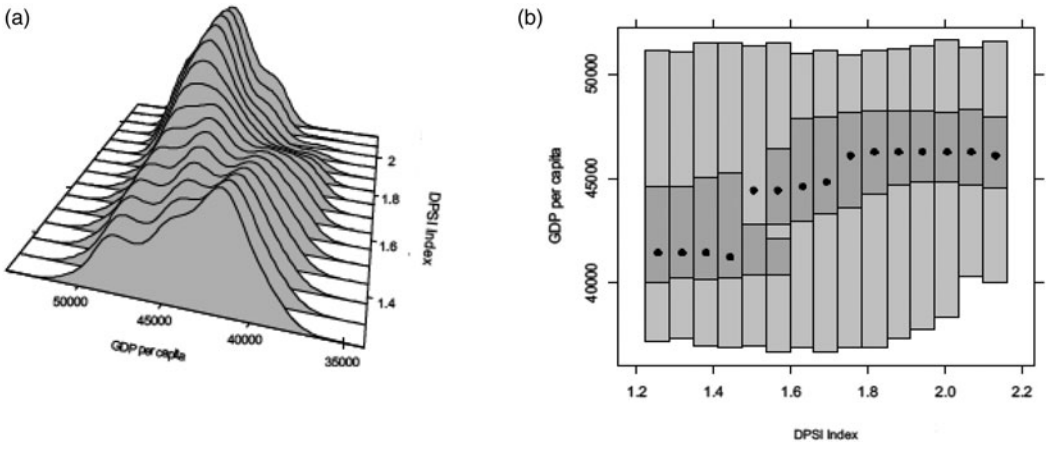

Figure 5. (a) Conditional kernel distribution between GDPpc and DPSI for club 2. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and DPSI for club 2. Period: 2002–2019.

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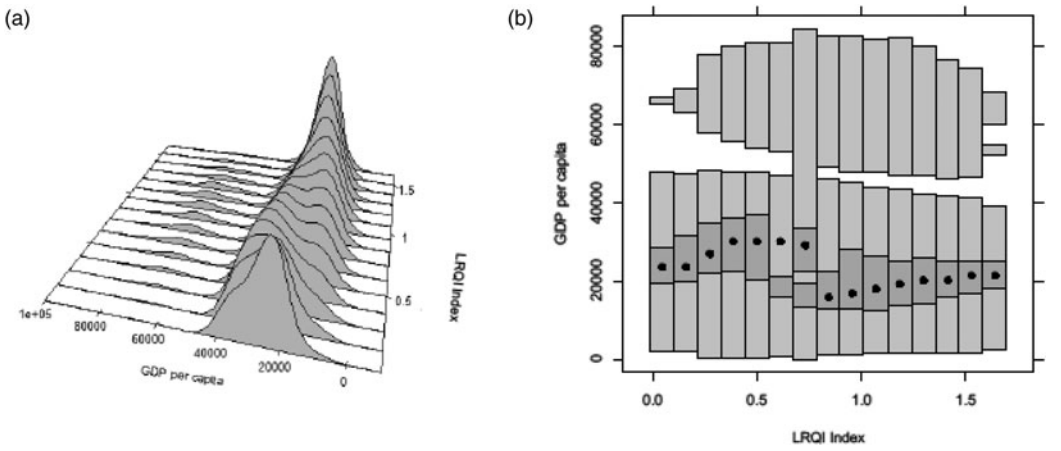

Figure 6. (a) Conditional kernel distribution between GDPpc and LRQI for club 3. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and LRQI for club 3. Period: 2002–2019.

clubs 1 and 2. As shown in Figures 7a and 7b, no subclusters of countries are detected within club 3. This suggests that higher democratic and bureaucratic quality, along with stronger anti-corruption measures, do not correlate with higher income. Instead, they generate homogeneity among the countries in this group, creating an 'institutional trap' that fosters convergence at lower income levels. This result aligns with the findings of Kar *et al.* (2019) and Glawe and Wagner (2021), who demonstrate the existence of such institutional traps, particularly prevalent in certain low-income countries worldwide and within the EU.

This study extends their observations by illustrating the occurrence of similar institutional traps within a cohort of high-income countries characterized by shared structural economic similarities. Within the optimal currency area of the Eurozone, the same patterns identified by these authors are replicated, with lower-income countries facing challenges in their political institutions.

In the case of the Eurozone, scholars such as Hatzis (2018) have highlighted the challenges faced by Southern countries, exemplified by Greece. Hatzis underscores that Greece's institutional weakness is

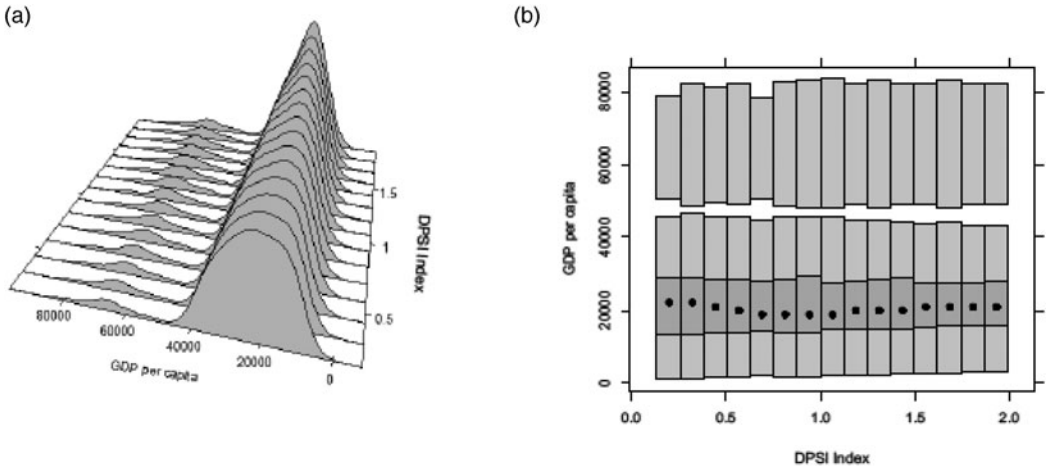

Figure 7. (a) Conditional kernel distribution between GDPpc and DPSI for club 3. Period: 2002–2019. (b) Bivariate HDR boxplot for GDPpc and DPSI for club 3. Period: 2002–2019.

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structural, keeping it ensnared in an institutional trap that undermines the convergence objectives of the EMU.

In accordance with Acemoglu and Robinson (2012), institutions need to become more inclusive to foster competitiveness and innovation, which are pivotal for growth. The 2019 Global Competitiveness Report indicates that all club 3 countries, except Spain, exhibited lower competitiveness compared to those in clubs 1 and 2. Therefore, supranational authorities must drive reforms to enhance political institutions in these countries, enabling them to break free from this vicious cycle and improve their per capita income.

However, promoting political institution reforms must navigate what Zimmermann (2016) refers to as the Euro trilemma. These changes must be deepened to foster convergence and EMU integration without compromising the sovereignty and democracy of peripheral countries. This also provides guidance for future Euro enlargements. The results of this study demonstrate that the political institutions of prospective members must be on par with existing member countries to prevent the emergence of additional distinct steady states and the widening of divergences. Following Zimmermann's recommendations, countries should join the optimal currency area only after successfully improving their political institutions, making the quality of these institutions – both aspect of political institutions – a precondition to prevent macroeconomic imbalances.

In summary, political institutional quality significantly affects the formation of multiple steady states in the Eurozone. This indicates that asymmetries in political institutions are preventing the achievement of convergence in terms of per capita income in the Euro area. Combined with the identified margin for improvement in political institutions, this analysis provides a direction for the Eurozone to achieve the economic convergence objective established at its inception.

Sensitivity analysis

The sensitivity analysis is conducted to determine how the results vary if the data changes. In this case, to verify that the findings are not influenced by the institutional quality database used, I repeat the entire previous analysis using two new indicators: the $LRQI_{it}$ and $DPSI_{it}$, utilizing the ICRG database and the sample period from 2002 to 2019. This database, developed by the PSR group, integrates various variables measuring the impact of governmental aspects on the economy. It relies on expert opinions and presents scores that, as they increase, indicate the country's better performance in that specific institutional aspect.

In this analysis, new two indicators are created: $LRQI_{ICRG_{it}}$ and $DPSI_{ICRG_{it}}$. The $LRQI_{ICRG_{it}}$ represents the average of three indicators from the ICRG database: Government Stability, Law and Order, and Investment Profile. The first of these variables measures the government's capacity to fulfil its mandate and advance its proposals, while the Law and Order refers to regulatory quality. Lastly, the Investment Profile assesses factors affecting investment, such as property rights protection and government payment to suppliers.

On the other hand, the new $DPSI_{ICRG_{it}}$ is calculated similarly using the Corruption, Democratic Accountability, and Bureaucracy Quality indicators. The Corruption indicator evaluates a country's corruption levels, Democratic Accountability assesses its transparency and democratic quality, and Bureaucracy Quality examines how the country's bureaucracy operates. The definitions of these variables resemble those of the original indicators and their use in this manner is supported by the literature (Beyaert *et al.*, 2019). The instrument described in equation (7) is also used in this case by applying GMM method of estimation, where in this case the I_{jt} indicators are constructed with the ICRG data instead of the WGI indicators.

The utilization of an alternative database, as evidenced by Table 4, does not substantively alter the outcomes of either ordered logit analysis. Across all instances, political institutional quality exerts an influence on the formation of convergence clusters and the probabilities of belonging to clusters among the wealthier countries in the EMU.

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Table 4. Ordered logit estimation by GMM for the Eurozone

	Coefficient	Std. error	*P*-values
$LRQI_{ICRG_{it}}$	−0.093**	0.039	0.017
GDP_{2002}	-2.58×10^{-5}***	1.55×10^{-6}	0.000
$Investment_{it}$	−0.017***	0.006	0.006
$Population_{it}$	-1.85×10^{-9}*	9.95×10^{-10}	0.063
$SSEnrollment_{it}$	−0.007***	0.001	0.000
$Trade_{it}$	−0.0007*	0.0004	0.053
α	5.282***	0.305	0.000
Adjusted R^2	0.753		
$N = 342$			
	Coefficient	Std. error	*P*-values
$DPSI_{ICRG_{it}}$	−0.410***	0.075	0.000
GDP_{2002}	-2.04×10^{-5}***	1.82×10^{-6}	0.000
$Investment_{it}$	−0.027***	0.004	0.000
$Population_{it}$	-1.68×10^{-9}*	9.56×10^{-10}	0.079
$SSEnrollment_{it}$	−0.003	0.002	0.123
$Trade_{it}$	−0.0008**	0.0004	0.026
α	5.843***	0.273	0.000
Adjusted R^2	0.769		
$N = 342$			

Period 2002–2019.
***, **, * denote statistical significance at the 1%, 5%, and 10%, respectively.

The convergence of these economies within the Eurozone aligns with the Solow model, underscored by the well-established evidence that institutional quality, particularly in the political domain, plays a consequential role in shaping the long-term trajectory of these economies.

Concluding remarks

The pursuit of economic convergence within the EMU is a foundational objective essential for fostering greater integration. Understanding the determinants influencing this convergence process is crucial for European authorities in decision-making and policy design. This study explores these drivers, specifically examining the role of political institutions when convergence is absent.

The findings indicate that asymmetries in political institutions hinder the Eurozone's ability to achieve convergence among all member countries, impeding comprehensive integration. Without convergence, GDP per capita is likely to diverge, particularly in peripheral countries with lower institutional quality. Additionally, the study confirms the presence of an institutional trap, further obstructing progress in these countries, consistent with the observations of Kar *et al.* (2019), and Glawe and Wagner (2021).

To overcome these obstacles, the Eurozone must promote economic and political integration by improving institutions across member states and progressively reducing asymmetries in political institutional quality, while considering the varying institutional structures among different subgroups of countries (Casagrande and Dallago, 2021). As proposed by Jolles *et al.* (2023) and Saha and Sen

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(2023), this approach will enhance macroeconomic resilience, helping to mitigate future crises. Therefore, the EMU and its members need to continuously monitor the process and develop policies to remove barriers to income convergence.

In summary, the political institutions of euro member states play a vital role in promoting the stability and prosperity of the European economy. However, their structure can also challenge the institutional quality of each member. It is particularly important to promote both aspect of institutional quality throughout the Eurozone to achieve levels of wealth similar to those in Ireland and Luxembourg, the two countries best positioned in terms of per capita income. Addressing these challenges requires ongoing efforts to improve the efficiency, transparency, and accountability of EU institutions and each country's own institutions. This will foster a more effective balance of power among the different levels of governance in the EU, ultimately achieving the long-awaited economic convergence and improving the welfare of EMU citizens.

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Appendix.

Table A1. Summary statistics

	Investment	*Population*	*School Enrollment*	*Trade*	*LRQI*[2]	*DPSI*[3]	$LRQI_{ICRG}$	$DPSI_{ICRG}$
Mean	21.845	17607938	108.999	127.423	1.089	1.176	7.690	4.278
Median	21.499	5430798	104.267	113.680	1.031	1.124	7.763	4.333
Std. Dev	4.208	24520895	15.919	71.133	0.371	0.451	0.917	0.602
Maximum	36.800	82905782	163.935	377.843	1.824	2.114	9.666	5.333
Minimum	10.770	395969	87.940	45.418	0.0513	0.239	5.541	3.000