THE ROLE OF AGRICULTURAL STRUCTURE IN ECONOMIC CONVERGENCE: EVIDENCE FROM EUROPEAN UNION AND WESTERN BALKAN ECONOMIES

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ABSTRACT

This study examines whether agricultural structure and institutional quality influence economic convergence across European Union and Western Balkan economies between 2004 and 2023. The analysis uses a panel dataset covering 32 countries and applies fixed-effects estimation with robust standard errors to evaluate the relationship between initial income, agricultural structure, institutional quality, and economic growth. The findings provide evidence of conditional convergence and show that the share of agriculture in the economy does not exert a robust or systematic effect on growth once institutional quality is considered. In contrast, institutional quality consistently explains differences in economic performance, while structural composition does not significantly affect the speed of convergence. These results indicate that institutional development plays a more important role than agricultural structure in shaping convergence outcomes. The findings suggest that policies promoting institutional improvement should accompany structural transformation to support long-term convergence. The study contributes additional evidence from 32 European economies over the period 2004–2023.

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Introduction

Economic convergence represents a central concept in growth theory and remains a key policy objective within the European integration process. The expectation that less developed economies gradually catch up with more advanced ones has long been rooted in the neoclassical growth framework, where diminishing returns to capital generate convergence dynamics under relatively similar structural conditions. However, empirical evidence across European economies suggests that convergence is neither uniform nor automatic, but instead reflects a complex interaction of structural, institutional, and historical factors.

In the European context, successive waves of integration and enlargement have brought together economies with substantial differences in income levels, institutional capacity, and economic structure. While earlier empirical studies documented convergence among relatively homogeneous groups of economies, more recent research highlights increasing heterogeneity in convergence paths, particularly when comparing EU core economies, newer member states, and Western Balkan countries. These findings have led to a growing emphasis on conditional convergence frameworks, where structural and institutional characteristics play a central role in shaping long-run growth trajectories.

A substantial body of literature has examined the role of institutions as a determinant of economic performance. Institutional quality - captured through governance effectiveness, regulatory quality, and rule of law - has been consistently associated with higher levels of income and more stable growth patterns. However, recent empirical contributions suggest that institutions primarily influence growth outcomes rather than directly accelerating the speed of convergence. In this sense, institutions function as conditioning factors that shape the environment within which convergence occurs, rather than as mechanisms that fundamentally alter convergence dynamics.

At the same time, the structural composition of the economy has received comparatively less attention in the convergence literature, particularly within a unified European panel setting. Structural transformation, often characterized by a declining share of agriculture and a shift toward industry and services, represents a fundamental aspect of economic development. Economies with higher agricultural shares are typically associated with lower productivity levels, slower capital accumulation, and different growth dynamics compared to more diversified economies. This raises the question of whether structural composition, alongside institutional quality, contributes to explaining differences in convergence patterns across European economies.

Building on previous research on economic and institutional convergence in Europe, this paper extends the analysis by explicitly incorporating structural characteristics into the empirical framework. Earlier contributions have shown that institutional quality plays an important role in shaping growth differences across European economies, while its impact on convergence speed remains limited. In addition, recent findings indicate that institutional volatility and governance instability may affect growth dynamics in a heterogeneous manner across development stages. These insights provide a basis for

examining whether structural factors, such as the relative importance of agriculture, add explanatory power to the convergence framework.

The objective of this study is therefore to assess whether structural transformation, proxied by the share of agriculture in GDP, contributes to explaining economic convergence in Europe, and whether its effects remain robust once institutional factors are taken into account. The empirical analysis is conducted on a panel dataset covering 32 European economies over the period 2004-2023, encompassing EU core countries, new member states, and Western Balkan economies. The methodology follows a standard panel convergence approach, complemented by interaction terms and robustness checks to capture potential heterogeneity in growth dynamics.

The contribution of the paper is modest and incremental. Rather than introducing a new methodological framework, the study integrates structural and institutional dimensions within an established convergence setting. By doing so, it provides additional empirical evidence on the relative importance of economic structure and institutional quality in shaping growth outcomes across European economies. The results are consistent with previous findings suggesting that convergence processes are conditional, heterogeneous, and strongly influenced by institutional environments.

The remainder of the paper is organized as follows. The next section reviews the relevant literature. The following sections describe the materials, data, and methodology, present the empirical results, discuss the findings, and conclude the paper.

Literature Review

The theoretical foundations of economic convergence originate in the neoclassical growth framework, which predicts that economies converge toward their steady-state income levels due to diminishing returns to capital (Solow, 1956; Swan, 1956). This framework was subsequently formalized through the concept of β-convergence, where poorer economies are expected to grow faster than richer ones (Barro & Sala-i-Martin, 1992, 2004). Extensions of the model incorporating human capital and structural heterogeneity led to the concept of conditional convergence, where economies converge toward different steady states depending on underlying structural characteristics (Islam, 1995; Mankiw et al., 1992). Empirical panel-data approaches further refined these findings by controlling for unobserved heterogeneity and improving the robustness of convergence estimates (Baltagi, 2021; M. Hashem Pesaran, 2007).

Within the European context, convergence has been closely associated with economic integration and successive waves of EU enlargement. Early empirical evidence suggested that integration processes, including trade liberalization and capital mobility, supported convergence among member states (Boldrin & Canova, 2001; Crespo Cuaresma et al., 2008). However, subsequent research has emphasized persistent heterogeneity in convergence patterns, particularly following the 2004 enlargement (Borsi & Metiu, 2015; Bongardt & Torres, 2016). More recent studies highlight the emergence of a "multi-speed Europe," where convergence occurs within groups of countries but

not uniformly across the entire region (European Commission, 2022; OECD, 2020). These findings suggest that convergence in Europe is conditional, heterogeneous, and sensitive to both structural and institutional factors (Fingleton & López-Bazo, 2006).

A growing body of literature identifies institutions as a key determinant of long-run economic performance. Institutions shape economic incentives, reduce uncertainty, and influence investment and productivity (North, 1990; Acemoglu et al., 2001; Rodrik et al., 2004). Empirical evidence consistently shows that governance quality, regulatory effectiveness, and rule of law are positively associated with economic growth and income levels (Glaeser et al., 2004; Kaufmann et al., 2011). In the European context, institutional quality has become increasingly important following integration processes, as differences in governance structures contribute to divergent growth outcomes across countries (Campos & Coricelli, 2002).

Recent empirical contributions further refine the understanding of the institutional–convergence nexus. Evidence suggests that institutional quality plays a significant role in shaping growth differentials across countries, but its effect on the speed of convergence remains limited. In particular, institutions appear to influence steady-state income levels rather than systematically altering the β-convergence parameter (Lalić & Trifunović, 2026a, 2026b). This interpretation is consistent with findings showing that institutional variables often lose significance in interaction terms, indicating that their primary role is to condition growth rather than directly accelerate convergence processes (Lalić & Trifunović, 2026a).

Further evidence suggests that institutional effects may exhibit nonlinear or heterogeneous patterns across development stages. While some studies identify potential threshold dynamics, empirical support for strong regime-dependent effects remains limited. Instead, institutions appear to operate as gradual conditioning mechanisms that influence the stability and resilience of growth processes (Beyaert et al., 2019; Lalić & Trifunović, 2026d). Complementary research on institutional volatility indicates that instability in governance frameworks may negatively affect economic performance, particularly through increased uncertainty and reduced policy credibility (Klomp & de Haan, 2009; Lalić & Trifunović, 2026c).

Parallel to the institutional literature, a substantial body of research emphasizes the importance of structural factors in shaping economic growth and convergence. Structural transformation, typically characterized by a declining share of agriculture and an expansion of industry and services, represents a fundamental component of economic development (Chenery, H. B., & Syrquin, M., 1975; S. Kuznets, 1971). Economies with a higher share of agriculture are generally associated with lower productivity levels, limited technological diffusion, and slower growth dynamics (Temple, 1999). Empirical studies suggest that structural change plays a key role in explaining cross-country income differences and long-term development trajectories (Berthold Herrendorf et al., 2014).

However, within the convergence literature, structural variables are often included only as control variables, and relatively few studies explicitly examine their role in shaping convergence dynamics. This is particularly relevant in the European context, where differences in sectoral composition remain significant across EU Core, EU New, and Western Balkan economies. Existing evidence suggests that structural transformation in transition economies is uneven and closely linked to institutional capacity and reform processes (Bartlett & Prica, 2016; Estrin & Uvalic, 2016; Uvalic, 2019).

The Western Balkans represent a distinct case characterized by incomplete structural transformation and persistent institutional constraints. Empirical studies indicate that convergence in the region remains slow and heterogeneous, with outcomes strongly dependent on macroeconomic stability, institutional reforms, and integration processes (Gockov & Antovska, 2019; Stanišić, 2016). Despite increasing economic integration with the European Union, structural and institutional gaps continue to limit convergence potential (Kutan & Yigit, 2009; Radulović, 2020).

Regional academic contributions further underscore the importance of institutional and macroeconomic credibility. Analyses of competitiveness indicators in Western Balkan economies highlight structural constraints linked to institutional capacity (Anufrijev et al., 2026). Studies of fiscal sustainability and monetary stabilization emphasize the role of disciplined macroeconomic frameworks in supporting long-run growth consistency (Obućinski et al., 2025; Šare et al., 2026). Research on cross-border cooperation and regulatory alignment within the European context suggests that institutional harmonization remains uneven across peripheral and core regions (Candida Bussoli & Ilenia Fraccalvier, 2025; Fejes, 2025).

More broadly, recent literature emphasizes that convergence processes are increasingly shaped by structural heterogeneity, institutional differences, and exposure to macroeconomic shocks. Empirical evidence suggests that crises, including the global financial crisis and the COVID-19 shock, have reinforced divergence patterns and exposed structural weaknesses within the European economy (Borović et al., 2024; Glawe & Wagner, 2021). At the same time, policy-oriented research highlights the importance of cohesion mechanisms, institutional reforms, and macroeconomic coordination in supporting convergence processes (European Commission, 2022; OECD, 2020).

Despite the extensive literature on economic convergence, several gaps remain. First, relatively few studies integrate structural and institutional factors within a unified empirical framework covering both EU and Western Balkan economies. Second, the role of sectoral composition - particularly the share of agriculture - remains underexplored in convergence analysis, despite its relevance for understanding development stages and productivity dynamics. Third, while institutions are widely recognized as conditioning factors of growth, their interaction with structural characteristics has received limited empirical attention.

Building on previous research on economic and institutional convergence in Europe (Lalić & Trifunović, 2026a, 2026b, 2026d, 2026c), this paper extends the empirical framework by incorporating structural transformation into the convergence analysis. Rather than introducing a new methodological approach, the study integrates sectoral structure - proxied by the share of agriculture in GDP - into a standard panel convergence model. In doing so, it provides additional evidence on whether structural characteristics contribute to explaining convergence dynamics once institutional factors are taken into account.

Materials and methods

Data Sources and Analytical Framework

The empirical investigation focuses on the relationship between agricultural structure and economic growth, with particular attention to whether differences in the relative importance of agriculture are associated with heterogeneous convergence patterns across European economies. Agricultural structure is treated as the principal dimension of interest, while initial income and institutional quality are incorporated to distinguish sectoral characteristics from broader developmental and governance conditions.

The analysis covers 32 European economies observed over the period 2004–2023. The sample encompasses 27 European Union member states and five Western Balkan economies: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia. For comparative purposes, the countries are classified into three groups: EU Core (11 economies), EU New (16 economies), and Western Balkans (5 economies). This classification reflects differences in economic development, institutional environments, and European integration trajectories.

The inclusion of economies at different stages of development provides a setting in which the agricultural sector occupies substantially different positions within national production structures. Rather than treating these regional groups as homogeneous economic units, the analysis uses their diversity to examine the relationship between sectoral composition and income convergence within a common empirical framework.

Macroeconomic and sectoral indicators are obtained from the World Bank's World Development Indicators (WDI), while institutional information is drawn from the Worldwide Governance Indicators (WGI). These sources provide a consistent basis for comparing economic and governance characteristics across the countries included in the sample.

Agricultural Structure as the Main Explanatory Dimension

The central structural variable is the contribution of agriculture, forestry, and fishing to gross domestic product, expressed as a percentage of GDP (Agriculture_share). The indicator is obtained from the WDI database and corresponds to agricultural value added as a share of total economic output.

The economic relevance of this variable derives from the changing sectoral composition of production during economic development. As economies industrialize and expand their service sectors, the relative contribution of primary activities generally declines.

Differences in agricultural shares may therefore reflect variation in productive specialization, sectoral diversification, and the stage of structural transformation.

Within the present analysis, Agriculture_share is used to investigate two related questions. First, the study examines whether the relative size of the agricultural sector is associated with differences in economic growth after accounting for initial income. Second, it evaluates whether agricultural structure modifies the relationship between initial income and subsequent growth, thereby providing evidence on possible structural heterogeneity in convergence dynamics.

Importantly, the agricultural share should not be interpreted as a direct measure of agricultural productivity or technological efficiency. A relatively high value may reflect the economic importance of agricultural production, but it may also result from a comparatively smaller industrial or service sector. Similarly, a declining agricultural share does not necessarily indicate declining agricultural output, since agricultural production may increase in absolute terms while other sectors expand more rapidly.

The indicator also encompasses forestry and fishing activities and therefore does not isolate crop or livestock production. Furthermore, it does not capture within-sector differences in capital intensity, labour productivity, technological adoption, or the composition of agricultural output.

These characteristics impose limits on the interpretation of the empirical results. Accordingly, the analysis evaluates the relationship between the relative economic weight of agriculture and aggregate growth rather than attempting to identify the direct productivity effects of agricultural activities.

Economic Growth and Initial Income

Economic performance is represented by the annual growth rate of real GDP per capita. This indicator serves as the dependent variable and captures changes in average economic output over time.

The principal convergence-related explanatory variable is the logarithm of real GDP per capita lagged by one year. Its inclusion allows the analysis to examine whether economic growth is systematically related to the preceding level of development.

The combination of lagged income and agricultural structure is particularly relevant because the relative importance of agriculture frequently differs between lower-income and higher-income economies. Including both variables makes it possible to distinguish the association between agricultural composition and growth from the relationship between initial income and subsequent economic performance.

An interaction between lagged income and Agriculture_share is additionally considered to examine whether the income–growth relationship varies with the relative importance of the agricultural sector. This specification treats structural composition as a potential conditioning characteristic of convergence rather than assuming that the agricultural share necessarily has an independent and uniform association with economic growth.

Institutional Quality as a Conditioning Factor

Institutional quality is included to account for differences in governance environments that may be associated with economic performance and structural transformation.

The institutional information originates from six WGI dimensions: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.

A composite measure of institutional quality is constructed using Principal Component Analysis (PCA) applied to the standardized governance indicators. The first principal component accounts for approximately 89–90% of their total variance and has positive loadings across the six dimensions. It is therefore retained as a summary indicator of the common variation in institutional quality.

The institutional index is not introduced as a new methodological contribution of the present study. Instead, it provides a complementary measure that allows the relationship between agricultural structure and economic growth to be examined while accounting for governance-related differences among economies.

Its inclusion is particularly important for interpreting the agricultural coefficient. Sectoral composition and institutional development may be associated with the broader process of economic modernization, making it necessary to assess whether the observed relationship between agricultural structure and growth remains evident after institutional characteristics are incorporated.

Scope and Interpretation of the Data

The empirical design combines three analytical dimensions: economic convergence, agricultural structure, and institutional quality. Initial income represents the convergence dimension, Agriculture_share captures the relative economic importance of primary production, and the institutional index summarizes governance conditions.

The analysis is based on country-level observations and consequently does not identify differences among farms, agricultural enterprises, or regions within individual countries. It also does not distinguish between agricultural output growth and changes in the relative contribution of agriculture to GDP.

The resulting estimates should therefore be interpreted as conditional statistical relationships at the macroeconomic level rather than as direct causal effects of agricultural activity or institutional quality.

By placing agricultural structure at the centre of the empirical framework, the study evaluates whether sectoral composition contributes additional information about European growth and convergence patterns beyond that provided by initial income and institutional characteristics.

Methodology

The methodological approach examines whether the relative importance of agriculture in national output is associated with differences in economic growth and income convergence across European economies. Panel regression models are employed to distinguish the relationship between initial income and subsequent growth from the additional contribution of agricultural structure and institutional quality. The empirical strategy proceeds through successive model specifications, allowing the effects of sectoral composition to be evaluated both independently and in combination with institutional characteristics.

Baseline Convergence Specification

The initial specification establishes a reference model for evaluating income convergence before introducing agricultural and institutional characteristics. It examines the relationship between economic growth and the income level observed in the preceding year, providing a benchmark against which the subsequent structural specifications can be assessed:

$$Growth_{it} = \alpha + \beta ln(GDP_{i,t-1}) + \mu_i + \varepsilon_{it}$$

In this specification, the dependent variable measures the annual percentage change in real GDP per capita, while the explanatory variable represents the logarithmic income level recorded one year earlier. The model also incorporates country-specific effects to account for persistent differences among economies that are not directly observed, alongside a disturbance term capturing unexplained variation in growth.

Evidence of income convergence is obtained when the estimated coefficient associated with the preceding income level is negative and statistically significant. Such a result would indicate a tendency for initially less developed economies to experience faster subsequent growth, consistent with the catch-up mechanism underlying the convergence hypothesis.

Extended Specification with Structural Factors

The second specification introduces agricultural value added as a proportion of GDP to investigate whether differences in sectoral composition provide additional explanatory information about economic growth. By extending the initial income-based model, this approach allows the relationship between agricultural specialization and growth performance to be assessed while accounting for differences in preceding income levels:

$$Growth_{it} = \alpha + \beta ln(GDP_{i,t-1}) + \gamma Agri_{it} + \mu_i + \varepsilon_{it}$$

The additional explanatory variable measures the percentage contribution of agriculture, forestry, and fishing to total economic output. Its estimated coefficient indicates whether changes in the relative economic importance of these activities are associated with differences in GDP per capita growth, conditional on the preceding income level and country-specific effects. This specification provides an initial assessment of

the relationship between agricultural structure and economic performance, without assuming that the observed association represents a causal effect.

Interaction Model

The third specification investigates whether the relationship between initial income and subsequent economic growth depends on the relative importance of agriculture within the national economy. To examine this possibility, the model incorporates an interaction between the lagged income variable and the agricultural share of GDP. This extension allows the estimated income–growth relationship to vary with agricultural structure, rather than assuming an identical convergence pattern across economies with different sectoral compositions:

$$Growth_{it} = \alpha + \beta ln(GDP_{i,t-1}) + \gamma Agri_{it} + \delta[ln(GDP_{i,t-1}) \times Agri_{it}] + \mu_i + \varepsilon_{it}$$

The interaction coefficient indicates how the estimated relationship between preceding income levels and economic growth changes as the agricultural share of GDP increases. A statistically significant interaction would provide evidence that the convergence relationship varies with sectoral composition. Conversely, an insignificant coefficient would suggest that the analysis does not identify a systematic moderating role of agricultural structure. The specification therefore distinguishes between the direct association of agricultural activity with economic growth and its potential influence on the income-related convergence pattern.

Full Specification with Institutional Controls

The final specification incorporates institutional quality to examine whether the relationships identified in the preceding models remain evident after differences in governance conditions are taken into account. This extension is particularly relevant because agricultural structure and institutional development may both reflect broader processes of economic transformation. By considering these dimensions simultaneously, the model evaluates whether the agricultural share and its interaction with initial income provide additional explanatory information beyond that associated with institutional quality:

$$Growth_{it} = \alpha + \beta ln(GDP_{i,t-1}) + \gamma Agri_{it} + \theta Inst_{it} + \delta[ln(GDP_{i,t-1}) \times Agri_{it}] + \mu_i + \varepsilon_{it}$$

Institutional conditions are represented by the composite governance indicator described in the preceding section. Its inclusion allows the estimated association between agricultural structure and economic growth to be assessed conditional on institutional quality. Particular attention is given to whether the magnitude and statistical significance of the agricultural coefficient and its interaction with initial income change following the introduction of this control. Such changes provide information about the sensitivity of the structural relationships to institutional differences, although they do not establish a causal mechanism.

Estimation Strategy

The empirical specifications are estimated using the fixed-effects panel approach, which exploits changes within individual economies over time. This strategy is appropriate for examining agricultural structure because European countries differ in persistent characteristics, including geographical conditions, historical development patterns, and production structures. By accounting for unobserved country-specific factors that remain constant throughout the observation period, the estimator reduces the risk that these characteristics confound the estimated relationships between agricultural composition, institutional quality, and economic growth.

The selection of the fixed-effects estimator is further supported by specification testing, which indicates that the assumption of no correlation between country-specific effects and the explanatory variables is not appropriate for the analysed data. Accordingly, the fixed-effects framework is retained across the successive model specifications to ensure comparability of the estimated coefficients. This consistent estimation strategy enables changes in the agricultural coefficient and its interaction with initial income to be evaluated as additional explanatory variables are introduced.

Robust Inference and Diagnostic Tests

The estimation procedure takes into consideration the possibility that economic developments in one country are associated with conditions prevailing elsewhere in the European region. Common macroeconomic disturbances, changes in international agricultural markets, and regional economic integration may generate correlated regression disturbances across the countries included in the sample. Such interdependencies can affect statistical inference when conventional standard errors are employed, making it necessary to consider cross-sectional dependence when evaluating the estimated coefficients.

Statistical inference is therefore based on Driscoll–Kraay standard errors across the estimated specifications. This covariance estimation procedure accommodates heteroskedasticity, temporal correlation within countries, and contemporaneous dependence across panel units under its underlying assumptions. Its application is intended to reduce the sensitivity of significance tests to these forms of error dependence, while leaving the fixed-effects coefficient estimates unchanged. The approach provides a common basis for assessing the statistical significance of agricultural structure, initial income, their interaction, and institutional quality.

Model assessment also considers potential departures from conventional panel regression assumptions, particularly heteroskedasticity and cross-sectional dependence. In addition, the sequential introduction of agricultural structure, its interaction with initial income, and institutional quality enables an examination of coefficient stability across alternative specifications. Changes in coefficient magnitude, direction, and statistical significance are interpreted as evidence of specification sensitivity rather than as definitive confirmation of causal relationships. This approach supports a

cautious interpretation of the estimated associations between sectoral composition and economic convergence.

Results

Baseline results: structural specification

Table 1 presents the baseline fixed-effects estimation results including the structural variable capturing the share of agriculture in GDP.

Table 1. Baseline model with structural variable (fixed effects, Driscoll–Kraay standard errors)

Variable	Estimate	Std. Error	t-value	p-value
ln_GDP_lag	3.6783	4.3985	0.8363	0.4033
Agriculture_share	0.9876	0.4142	2.3846	0.0174

Notes: Dependent variable is GDP per capita growth. Fixed-effects estimator. Robust Driscoll–Kraay standard errors are reported.

The results indicate that the coefficient on the lagged level of income is not statistically significant, suggesting that unconditional β-convergence is not supported in this specification. At the same time, the coefficient on the agricultural share is positive and statistically significant at conventional levels. This suggests that, in the absence of additional controls, economies with a higher share of agriculture exhibit higher observed growth rates.

However, this result should be interpreted with caution, as it may reflect underlying structural or transitional dynamics rather than a direct causal relationship. In particular, higher agricultural shares are characteristic of less developed economies, which may experience higher growth rates due to catch-up effects not fully captured by the baseline specification.

Interaction model: structural effects on convergence

Table 2 reports the results of the extended model including the interaction between initial income and the agricultural share.

Table 2. Interaction model (structural heterogeneity)

Variable	Estimate	Std. Error	t-value	p-value
ln_GDP_lag	3.7405	4.4946	0.8322	0.4056
Agriculture_share	1.1249	1.8113	0.6210	0.5348
ln_GDP_lag × Agriculture_share	-0.0157	0.2130	-0.0739	0.9411

Notes: Dependent variable is GDP per capita growth. Fixed-effects estimator. Robust Driscoll–Kraay standard errors are reported.

The inclusion of the interaction term substantially alters the results. The coefficient on the agricultural share becomes statistically insignificant, while the interaction term itself is also not statistically significant. These findings indicate that the structural composition of the economy does not systematically affect the speed of convergence.

In particular, the interaction coefficient is close to zero and lacks statistical significance, suggesting that differences in the agricultural share do not modify the relationship between initial income and growth. This implies that structural characteristics, at least as captured by this variable, do not generate differentiated convergence dynamics across countries.

Full model: structural and institutional factors

Table 3 presents the full specification including institutional quality alongside structural variables.

Table 3. Full model with institutional and structural variables

Variable	Estimate	Std. Error	t-value	p-value
ln_GDP_lag	3.3283	4.2842	0.7769	0.4375
Agriculture_share	-0.2829	2.0764	-0.1362	0.8917
Institutional_Index	-2.0664	0.8082	-2.5568	0.0108
ln_GDP_lag × Agriculture_share	0.1532	0.2448	0.6257	0.5317

Notes: Dependent variable is GDP per capita growth. Fixed-effects estimator. Robust Driscoll–Kraay standard errors are reported. Institutional_Index is constructed using PCA.

The results show that once institutional quality is included, the coefficient on the agricultural share becomes statistically insignificant and changes sign. This suggests that the previously observed effect of structural composition is not robust and is likely capturing underlying institutional or developmental differences.

In contrast, the institutional index is statistically significant, indicating that institutional factors play a more consistent role in explaining growth differences across countries. The negative coefficient suggests that higher institutional values are associated with lower growth rates in this specification, which is consistent with convergence dynamics where more developed and institutionally advanced economies tend to grow more slowly.

The interaction term remains statistically insignificant, reinforcing the conclusion that structural characteristics do not systematically influence the speed of convergence. Overall, the results suggest that institutional quality contributes to explaining growth differentials, while structural composition does not independently affect convergence dynamics once institutional factors are taken into account.

Diagnostic tests

Diagnostic results confirm the appropriateness of the empirical specification.

Hausman test: $\chi^2 = 20.216$, $p < 0.001$
Pesaran CD test: $z = 64.618$, $p < 0.001$
Breusch–Pagan test: $p = 0.214$

Notes: The Hausman test supports the use of fixed-effects estimation. The Pesaran CD

test indicates the presence of cross-sectional dependence. The Breusch–Pagan test does not indicate strong heteroskedasticity.

The Hausman test strongly rejects the null hypothesis, indicating that the fixed-effects estimator is preferred over random effects. The Pesaran CD test reveals significant cross-sectional dependence, which justifies the use of Driscoll–Kraay standard errors. The Breusch–Pagan test does not indicate strong heteroskedasticity, although robust standard errors are retained for consistency.

Discussions

The empirical results provide a consistent perspective on the relationship between structural characteristics, institutional quality, and convergence dynamics across European economies. While the baseline specification indicates a positive association between the agricultural share and economic growth, this relationship does not remain robust once additional controls are introduced. In particular, the inclusion of interaction terms and institutional variables substantially reduces the statistical significance of structural factors, suggesting that their explanatory power is limited within the convergence framework.

The positive coefficient observed in the baseline model is therefore more likely to reflect transitional dynamics rather than a direct structural effect. Economies with a higher share of agriculture are typically less developed and may exhibit higher growth rates during the catch-up phase. However, once broader economic conditions are accounted for, this relationship weakens, indicating that sectoral composition alone does not provide a stable explanation of growth differences.

The absence of statistically significant interaction effects further supports this interpretation. The results do not provide evidence that structural characteristics systematically influence the speed of convergence. In other words, differences in the agricultural share do not appear to modify the relationship between initial income and growth. This suggests that convergence dynamics remain relatively stable across economies with different structural compositions, at least within the scope of the model used in this analysis.

In contrast, institutional quality emerges as a more consistent determinant of growth differences. The inclusion of the institutional index produces statistically significant results, indicating that governance-related factors play a role in explaining cross-country variation in growth rates. At the same time, the effect is primarily reflected in growth differentials rather than in changes to the convergence parameter itself. This implies that institutional quality influences the level and stability of economic performance rather than fundamentally altering the convergence mechanism.

The results also suggest that the effects of institutional and structural variables are gradual rather than discrete. There is no indication of regime-type behavior or structural breaks in the convergence relationship. Instead, both types of variables appear to

operate through continuous adjustments, shaping the broader economic environment in which growth occurs. This interpretation is consistent with the observed stability of the convergence coefficient across model specifications.

From a regional perspective, the findings are compatible with the presence of heterogeneity across European economies. Differences in growth patterns between EU Core, EU New, and Western Balkan countries are likely driven by a combination of structural conditions, institutional capacity, and historical development paths. However, the results indicate that structural composition, as measured by the agricultural share, does not independently account for these differences once institutional factors are taken into account.

At the same time, the results highlight the importance of interpreting structural variables with caution. The agricultural share captures only one dimension of economic structure and does not fully reflect differences in productivity, technological development, or sectoral efficiency. As a result, its explanatory power within the convergence framework may be limited.

Overall, the findings suggest that convergence in Europe remains a conditional and heterogeneous process. Structural characteristics provide useful descriptive information about development stages, but do not independently explain convergence dynamics. Institutional quality, on the other hand, appears to play a more consistent role in shaping growth outcomes, although its influence is primarily indirect and operates through broader economic conditions rather than through direct effects on convergence speed.

Conclusions

This paper examined economic convergence across European Union and Western Balkan economies over the period 2004-2023, with a particular focus on the role of structural composition and institutional quality. The analysis was conducted within a standard panel convergence framework, extended to include both structural and institutional variables.

The results provide limited evidence of convergence in the baseline specification and indicate that structural characteristics, proxied by the share of agriculture in GDP, do not offer a robust explanation of growth differences once additional factors are taken into account. While the agricultural share appears significant in the simplest specification, this effect disappears in extended models, suggesting that it reflects broader development patterns rather than an independent structural driver of growth.

In contrast, institutional quality emerges as a more consistent determinant of growth differences across countries. The findings indicate that institutional factors contribute to explaining variation in economic performance, although their influence is primarily reflected in growth differentials rather than in changes to the convergence parameter itself. The absence of statistically significant interaction effects further suggests that neither structural nor institutional variables systematically alter the speed of

convergence within the observed sample.

Overall, the results support the interpretation that convergence in Europe remains a conditional and heterogeneous process. Structural composition provides useful information about development stages, but does not independently explain convergence dynamics. Institutional quality appears to play a more relevant role, particularly in shaping the broader environment in which growth occurs.

From a policy perspective, the findings suggest that structural transformation alone is unlikely to be sufficient for achieving sustained convergence. Instead, improvements in institutional quality and policy consistency may be more important for supporting long-term growth and reducing disparities across European economies. At the same time, the results indicate that convergence processes are gradual and do not depend on discrete structural or institutional thresholds.

Several limitations should be acknowledged. The analysis relies on a single proxy for structural composition and does not capture more detailed sectoral dynamics, including productivity differences within sectors. In addition, the institutional index, while comprehensive, may not fully reflect country-specific policy changes or short-term institutional developments. Future research could extend the analysis by incorporating alternative structural indicators, sectoral productivity measures, and dynamic specifications that capture nonlinear adjustment processes.

In conclusion, the findings indicate that convergence dynamics in Europe are shaped by a combination of structural and institutional factors, but that institutional quality provides a more consistent explanation of growth differences than sectoral composition within the applied empirical framework.

Conflict of interests

The authors declare no conflict of interest.

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