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Structural Convergence of Macroeconomic Indicators in the European Union (2000–2024)

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ABSTRACT

This study analyses the dynamics of structural convergence of macroeconomic indicators within the European Union during 2000-2024 period of time, using an approach based on the transition matrix and similarity measures between cluster structures. The analysis highlights the way in which the relationships between economic indicators evolve over time, capturing both stability processes and episodes of structural fracture generated by major shocks. The results demonstrate that convergence does not follow a linear or cumulative path, but manifests discontinuously, being strongly influenced by contexts of crisis. Periods of time characterised by systemic constrains, such as the global financial crisis or the COVID-19 pandemic, are associated with high levels of structural similarity, reflecting institutionally and behaviourally induced convergence. On the other hand, in the absence of these shocks, economies tend to evolve differently, which leads to fragmentation of structures and a reduction in internal coherence. By using statistical measures of similarity and structural distance, the study offers an integrated perspective on the stability and mobility of the relationships between macroeconomic indicators, highlighting the episodic and fragile character of European convergence. The conclusions suggest that the resilience of the European Union does not derive from the maintenance of a stable structure, but from the capacity to repeatedly reorganize in the face of external shocks.

Keywords: AMI, ARI, Cluster Analysis, Convergence, Cramer's V, UE-27, NMI, VI.
JEL Classification: C33, C38, F15, O47, O52.

INTRODUCTION

Economic convergence within the European Union has been from the begining, a central objective of the integration process. European Treaties promotes cohesion, structural funds are oriented toward reducing disparities, and institutional raports monitor progress in this this direction. Nevertheless, empirical evidence suggests that the convergence process in more complex than these objectives might indicate, being characterized by uneven and often discontinuous developments. The question regarding whether European economies are converging is not new. Foundational works, such as those by Solow (1956), Barro and Sala-i-Martin (1992), as well as Quah (1993), have shaped the theoretical and empirical framework of this database. The dominant conclusion has been that some form of convergence exists, yet it is incomplete, conditional, and heterogeneous across economies. Nevertheless, the literature has primarily focused on the evolution of indicator levels, paying less attention to how the relationship between them changes over time. Starting from this limitation, the present study proposes an approach oriented toward the structural and temporal dimension of convergence. The core hypothesis

is that the relationships between macroeconomic indicators are not stable, rather, they reorganize according to the economic context.

These reorganizations can occur gradually or abruptly, being influenced by major shocks, such as global financial crisis of 2007-2009 or COVID-19 pandemic, ans sometimes appear as a result of slow processes that develop over the time and are difficult to observe. The paper is structured in three main sections. The first section presents the methodology, data, and analysis methods. The second section analyzes the structural dynamics of macroeconomic indicators, using transition matrices and similarity measures. The last section brings together the conclusions, summarizes the main results, and highlights their implications.

In order to capture this dynamic, the analysis utilizes the transition matrix applied to cluster-type structures and a set of statistical similarity measures, which allow for the evaluation of the degree to which the structure of one time interval is reflected in the subsequent interval. This approach complements classical methods of convergence analysis, offering an additional perspective on the stability and mobility of the relationship between macroeconomic indicators. The results suggest that the convergence process within the European Union is not linear or cumulative, but rather episodic and context-dependent. High levels of structural similarity emerge during periods marked by major shocks, when common constrains limit divergence among member states. Conversely, during periods of relative stability, the structure of economic relationships becomes more fragmented, and economies tend to follow differentiated trajectories. The work is structured as follows. The next section presents the theoretical framework and the main contributors from the specialized literature regarding economic convergence. The methodology section describes the data used and the methods applied in the analysis. The third section examines the structural dynamics of macroeconomic indicators based on the transition matrix and similarity measures. Finally, the work paper concludes with a section that synthesizes the main results and highlights their implications.

METHODOLOGY

The analysis is based on a set of macroeconomic indicators relevant to European Union member states, covering the 2000-2024 period of time. The used data are from a previous, unpublished research of the author, in which they were compiled and processed using official sources Eurostat and World Bank, to ensure comparability between countries and periods of time. In this previous research, for each analyzed internal (2000-2004, 2005-2009, 2010-2014, 2015-2019, 2020- 2024), indicators were grouped into clusters based on their behavioral similarity, using statistical analysis methods within the R software environment. Furthermore, a transition matrix was constructed to capture changes in the cluster membership of these indicators between periods. The current study does not replicate the clustering process but rather uses the previously obtained results to analyze the degree of structural similarity between successive periods. To this end, several complementary statistical measures are applied, which allow for the evaluation of the extent to which the cluster structure of one period is reflected in the following period. By using these indicators, the analysis aims to identify the level of continuity, reorganization, or structural rupture in the evolution of relationships between macroeconomic indicators. Therefore, the methodological approach focuses on the structural dynamics of convergence, highlighting how the coherence of the European economic system changes over time.

CASE STUDY

The results obtained through the analysis of the transition matrix highlight the fact that the structure of relationships among European macroeconomic indicators evolved dynamically, passing through successive phases of stability, rupture, and reconstruction. However, the changes described by inter-cluster mobility provide only a local perspective, capturing transformations between two consecutive periods without quantifying the overall degree of structural similarity across the entire interval under analysis.

To overcome this descriptive limitation, it becomes necessary to apply a set of synthetic similarity measures capable of objectively quantifying the proximity between the clustering structures associated with different periods.

Such indicators, including Adjusted Mutual Information (AMI), Normalized Mutual Information (NMI), Variation of Information (VI), Adjusted Rand Index (ARI), and Cramer's V, allow for a comparative assessment of structural stability by measuring the extent to which groups of indicators from one period overlap with or are reconfigured in the subsequent period.

In this context, the present section analyzes the evolution of the degree of structural similarity across the periods 2000–2004, 2005–2009, 2010–2014, 2015–2019, and 2020–2024, in order to identify moments of continuity and rupture in the aggregate behavior of the indicators. By correlating these measures, the analysis distinguishes between the stability of economic convergence and the structural volatility induced by crises, thereby providing an interpretative framework regarding the manner in which the European economy reconstructs its internal coherence following each major shock.

The AMI (Adjusted Mutual Information) indicator represents a statistical measure used to evaluate the degree of similarity between two clustering structures, regardless of their labels or size. AMI is adjusted for chance, meaning that it eliminates the portion of similarity that could occur randomly. Consequently, its value reflects only the real, non-random overlap between the compared structures, making it one of the most robust and objective measures for assessing cluster stability across periods. A high value indicates that economic and institutional mechanisms remained coherent, whereas low values reflect a rupture in the functional logic of macroeconomic relationships, often associated with phases of crisis, transition, or structural realignment.

The analysis of structural similarity across the analyzed periods is summarized in Figure 1 and Table 1, which present the evolution of the AMI indicator for successive transitions within the 2000–2024 interval. The values reveal significant variations in the degree of structural continuity, suggesting alternations between phases of stability and reconfiguration. These results provide an initial overview of the dynamics of convergence within the European Union.

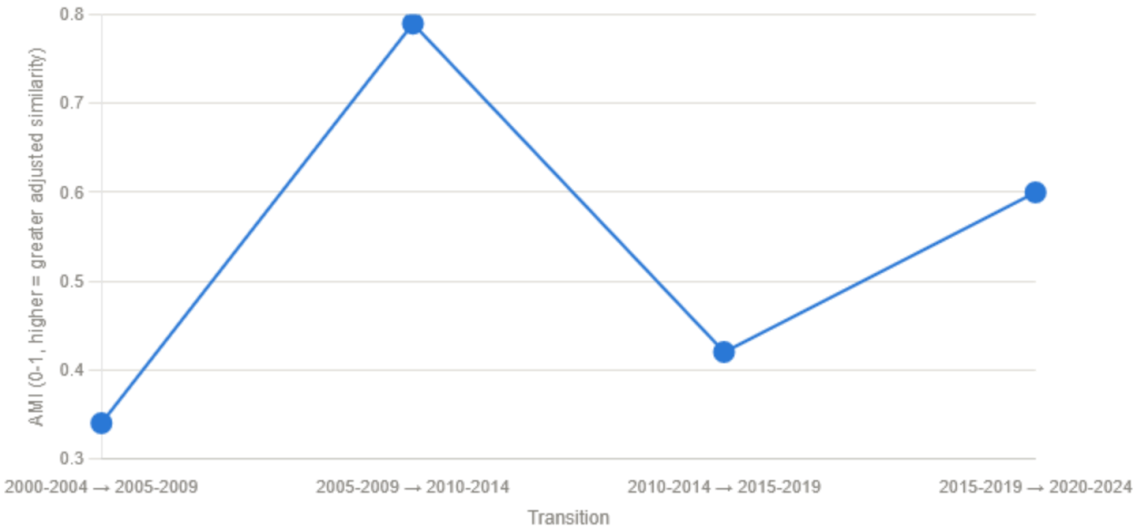


Figure 1 – Evolution of the AMI indicator across periods (2000–2024)
Source: Authors' own computation in RStudio

Table 1. Values of the AMI indicator for transitions between periods (2000–2024)

Period	AMI
2000-2004 → 2005-2009	0.34
2005-2009 → 2010-2014	0.78
2010-2014 → 2015-2019	0.41
2015–2019 → 2020-2024	0.60

Source: Authors' own computation in RStudio

The transition 2000–2004 → 2005–2009 (AMI = 0.34) is weak because the economies during 2005–2009 no longer function according to the rules of the early 2000s. The first period is relatively coherent, characterized by growing economies and expansion based on apparent stability. After 2005, capital inflows, financial deregulation, and credit expansion profoundly altered the behavior of economic and social actors. The actual rupture emerged during 2007–2009, when the global financial crisis destroyed the mechanisms that had sustained the previous period. The economic and social structure of 2000–2004 could no longer explain the post-crisis reality. Therefore, the AMI value is low, reflecting not continuity, but rather a major structural discontinuity.

In the transition 2005–2009 → 2010–2014 (AMI = 0.78), the highest value appears because the 2010–2014 period was coherently constructed on the basis of previous adjustments. The 2007–2009 financial crisis functioned as a moment of forced homogenization; rather than deepening divergence, the shock led the EU to adopt common regulatory frameworks, coordinated fiscal policies, and mechanisms of economic supervision. During the immediate subsequent period, these rules were consistently implemented, generating the highest AMI value in the series. This does not reflect a natural convergence of development levels, but rather an institutional and behavioral convergence induced by the common response to the crisis.

The decline observed in 2010–2014 → 2015–2019 (AMI = 0.42) occurs because post-crisis stability began to erode. Differences among the economies of member states re-emerged, while political and social tensions affected the Union's internal coherence. Common policies were increasingly contested or implemented unevenly, reducing similarity between periods and indicating a modification of convergence dynamics within the EU. The structure established during 2010–2014 did not disappear entirely, but it began to be undermined by the emergence of new behaviors and divergent priorities.

The increase recorded for 2015–2019 → 2020–2024 (AMI = 0.60) can be explained by a dominant event: the COVID-19 pandemic. Coordinated responses at the European level, massive state intervention, and common financing mechanisms induced a relative degree of homogeneity among member states. Nevertheless, the AMI value remains below the maximum, suggesting that this convergence is more conjunctural than structural. It may therefore be described as a form of forced convergence, constructed under conditions of pressure.

In conclusion, the evolution of AMI values indicates that the convergence process within the European Union is neither linear nor cumulative, but rather fragmented and dependent on major shocks. At the beginning of the analyzed period, the economic and social structures of member states evolved relatively divergently, while successive EU enlargements introduced additional structural differences. New member states entered with different levels of development, and convergence mechanisms were not yet sufficiently consolidated to generate homogenization. On the other hand, AMI values demonstrate that convergence within the EU emerges predominantly during periods of crisis, when common constraints reduce the economic and decision-making autonomy of member states. In the absence of such shocks, the dominant tendency is differentiation rather than convergence. Thus, convergence within the EU is real, but discontinuous, induced, and fragile, rather than an automatic and permanent process.

The analysis is complemented by the values of the NMI indicator, presented in Figure 2 and Table 2, which provide a perspective on the raw informational similarity between periods. Compared with AMI, NMI values are systematically higher, suggesting the existence of a general informational continuity even in the absence of strong structural stability. This difference highlights the fact that part of the observed similarity between periods is determined by broad common characteristics rather than by the effective persistence of clusters.

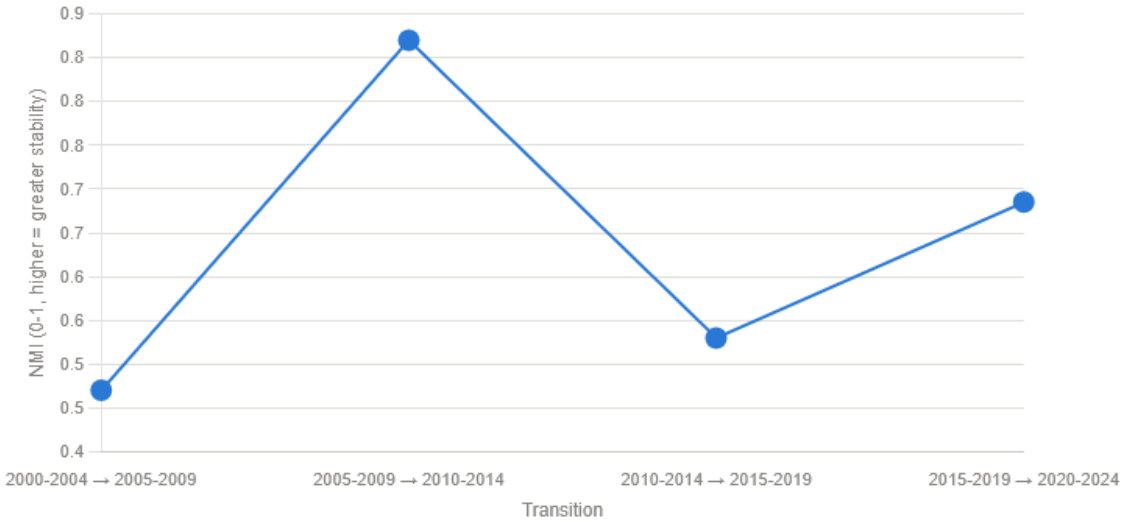


Figure 2 - Evolution of the NMI indicator across periods (2000–2024)
Source: Authors' own computation in RStudio

Table 2. Values of the NMI indicator for transitions between periods (2000–2024)

Period	NMI
2000-2004 → 2005-2009	0.47
2005-2009 → 2010-2014	0.82
2010-2014 → 2015-2019	0.52
2015–2019 → 2020-2024	0.68

Source: Authors' own computation in RStudio

NMI is systematically higher than AMI, indicating that the raw informational similarity between periods exceeds the adjusted structural similarity. The difference between the two metrics suggests that part of the observed continuity is explained by general structural correspondences rather than by the actual persistence of clusters over time.

The NMI value recorded for the transition 2000–2004 → 2005–2009 (0.47) indicates that the economic structure of the European Union during 2005–2009 preserved only part of the informational content specific to the previous period. Although certain common elements remained identifiable, they were insufficient to support the existence of clear continuity. The early 2000s were characterized by relatively homogeneous expansion, gradual integration, and macroeconomic stability. After 2005, however, this framework began to fragment as a consequence of several developments, including EU enlargement, the accelerated dynamics of financial flows, and the accumulation of macroeconomic imbalances within certain economies. An NMI value below 0.5 suggests that

a significant proportion of the structural information associated with 2000–2004 was no longer transferable to the subsequent period. From this perspective, the 2005–2009 interval should be interpreted not as a continuation of the beginning of the decade, but rather as a phase of structural transition.

The transition 2005–2009 → 2010–2014 records an NMI value of 0.82, representing the highest level in the series and indicating a very strong degree of informational similarity between the two periods. From a structural perspective, the 2010–2014 interval remained strongly anchored in the realities generated during 2005–2009. The 2007–2009 financial crisis acted as a systemic shock that homogenized both economic and institutional behavior across the European Union. Adjustment mechanisms, fiscal consolidation policies, structural reforms, and economic surveillance measures were implemented within a common institutional framework, allowing the post-crisis structure to preserve almost intact the structural information characteristic of the crisis period. The exceptionally high NMI value reflects this near-complete informational continuity.

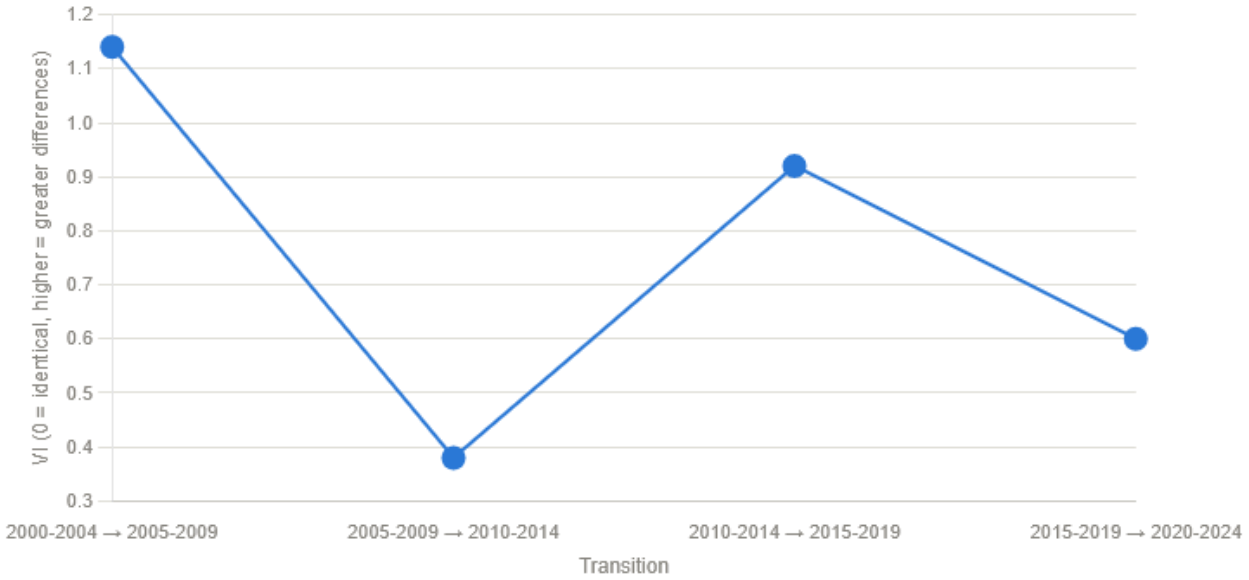
The decline in NMI to 0.53 for the transition 2010–2014 → 2015–2019 indicates a substantial loss of common informational content, although not a complete structural rupture. The post-crisis economic structure gradually became more diversified, while member states increasingly followed differentiated trajectories of development. After the phase of coordinated adjustment, European economies returned to a more autonomous growth dynamic. Recovery rates diverged, economic policy priorities became increasingly heterogeneous, and political as well as social tensions intensified. An NMI value of approximately 0.53 suggests that the structural configuration specific to 2010–2014 remained visible, but no longer exerted a dominant influence over the following period.

The increase in NMI to 0.68 during the transition 2015–2019 → 2020–2024 indicates a renewed process of structural rapprochement between the two periods. A significant share of the informational structure characterizing 2015–2019 remained observable during 2020–2024, although not at the exceptionally high levels recorded previously. The COVID-19 pandemic introduced a new common shock, generating relatively homogeneous responses through large-scale state intervention, expansionary fiscal policies, and common financing mechanisms at the European level. These developments restored a relatively high degree of informational similarity among member states. Nevertheless, the NMI value remained below the level observed for 2010–2014, suggesting that this convergence was partial and largely generated under conditions of systemic pressure rather than through durable structural homogenization.

The NMI analysis confirms that the structural evolution of the European Union is characterized by alternating phases of fragmentation and realignment rather than by a continuous process of convergence. Informational similarity reaches its highest levels in periods immediately following major shocks, when common constraints impose relatively similar policy responses and behavioral patterns across member states. In this respect, NMI indicates that the European Union functions as a system capable of generating temporary convergence during periods of crisis, while tending to return to a more heterogeneous structure in the absence of strong systemic constraints. The evolution of NMI values demonstrates that the structural dynamics of the European Union are defined by variable informational continuity rather than permanent stability. Consequently, European dynamics are shaped not by the progressive accumulation of convergence, but by the alternation between phases of informational concentration and dispersion, which explains the simultaneously unstable and resilient character of the European system.

The analysis is further complemented by the VI indicator, presented in Figure 3 and Table 3, which measures the structural distance between periods. The evolution of this indicator highlights both moments of structural rupture and periods during which the system tends to stabilize.

Figure 3 - Evolution of the VI indicator across periods (2000–2024)



Source: Authors' own computation in RStudio

Table 3. Values of the VI indicator for transitions between periods (2000–2024)

Period	VI
2000-2004 → 2005-2009	1.15
2005-2009 → 2010-2014	0.38
2010-2014 → 2015-2019	0.92
2015–2019 → 2020-2024	0.61

Source: Authors' own computation in RStudio

The transition 2000–2004 → 2005–2009 records the highest VI value in the series (1.15), indicating a substantial loss of information between the two periods. In practical terms, the cluster structure specific to 2000–2004 explains only a limited portion of the organization of indicators observed during 2005–2009. This evolution does not reflect a gradual adjustment process, but rather a structural transformation. The 2000–2004 interval was characterized by a relatively coherent organization of indicators, supported by macroeconomic stability and a process of gradual European integration. After 2005, however, this order progressively began to disintegrate as EU enlargement, the acceleration of financial flows, and the accumulation of internal imbalances altered the relationships among indicators even before the effects of the financial crisis became fully visible in aggregated data. The elevated VI value therefore captures the fact that structural rupture began prior to the crisis itself.

The sharp decline in VI to 0.38 for the transition 2005–2009 → 2010–2014 reflects the extent to which the structural configuration formed during the crisis period was subsequently preserved and consolidated in the post-crisis interval. In this context, the global financial crisis functioned as a mechanism of systemic simplification and homogenization, as relationships among indicators became more predictable, more stable, and easier to interpret. Adjustment policies, common regulatory frameworks, and fiscal constraints generated a relatively rigid institutional architecture that remained largely unchanged during 2010–2014. A low VI value does not necessarily indicate structural health, but rather a reduction in the system's degree of flexibility. Structural coherence emerged precisely because the system operated under strong external and institutional constraints.

The significant increase in VI to 0.92 for the transition 2010–2014 → 2015–2019 signals a renewed loss of structural information, reflecting the reconfiguration of relationships among indicators and the gradual dissolution of the post-crisis cluster structure. This evolution illustrates the process through which post-crisis rigidity began to decompress. As the pressure associated with coordinated adjustment mechanisms weakened, member state economies increasingly followed differentiated trajectories, while public policy priorities became more diverse. Indicators no longer reacted within the same structural combinations, leading to the fragmentation of the previous configuration. The elevated VI value suggests that this period should not be interpreted as a continuation of convergence, but rather as a phase of re-individualization of economic trajectories, in which the previously imposed order became progressively unsustainable.

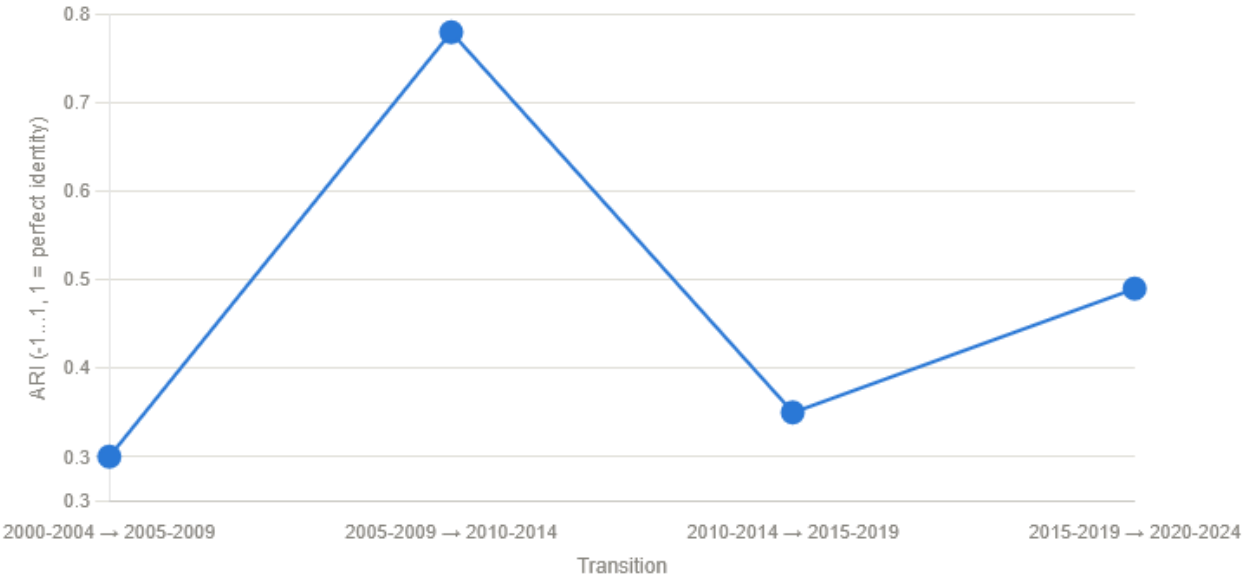
The subsequent decline in VI to 0.62, compared with the previous transition, suggests a partial reduction in structural disorder, although without a return to the degree of stability observed during the immediate post-crisis period. The structure continued to evolve, while part of the informational content associated with the previous interval remained relevant. This development is consistent with the emergence of a dominant external shock

capable of reintroducing a degree of coordination among economic policies and behavioral responses. Nevertheless, the VI value remained relatively elevated, indicating that this convergence was partial and context-dependent rather than structurally consolidated. The European system responded in a coordinated manner under conditions of pressure, but without reconstructing a stable institutional architecture comparable to that observed during 2010–2014.

The evolution of VI confirms that structural disorder and subsequent reordering represent recurrent features of the European convergence process. Continuity tends to emerge primarily under conditions of severe systemic constraint, whereas periods of relative stability are often associated with significant losses of structural information. In this respect, VI reinforces from a different perspective the conclusions suggested by both AMI and NMI, namely that convergence within the European Union is not cumulative in nature, but episodic, characterized by alternating phases of rigidification and fragmentation.

The analysis is further complemented by the ARI indicator, presented in Figure 4 and Table 4, which evaluates the degree of consistency in the assignment of indicators to clusters across successive periods. Unlike NMI, ARI directly penalizes structural modifications, thereby explicitly highlighting the redistribution of indicators among clusters. Its values therefore reflect the level of structural stability, indicating whether the relationships among indicators remain stable or undergo reconfiguration over time.

Figure 4 - Evolution of the ARI indicator across periods (2000–2024)



Source: Authors' own computation in RStudio

The ARI value of approximately 0.30 for the transition 2000–2004 → 2005–2009 indicates a low degree of consistency in cluster structures between the two periods. This transition captures the beginning of a structural reorganization process, even though European economies still appeared relatively stable at the surface level. Indicators that evolved coherently within the same groups during 2000–2004 gradually began to separate, signaling the erosion of synchronization among economic, fiscal, and social dimensions.

Table 4. Values of the ARI indicator for transitions between periods (2000–2024)

Period	ARI
2000-2004 → 2005-2009	0.30
2005-2009 → 2010-2014	0.74
2010-2014 → 2015-2019	0.35
2015–2019 → 2020-2024	0.49

Source: Authors' own computation in RStudio

The low ARI value confirms that not only the values of the indicators changed, but also the relationships connecting them. This suggests that the growth model characteristic of the early 2000s was no longer capable of organizing the system in a stable manner, while the 2005–2009 interval functioned as a phase of structural transition preceding the explicit rupture generated by the global financial crisis.

The ARI value of 0.75 for the transition 2005–2009 → 2010–2014 represents the highest level in the series and indicates a very strong degree of structural continuity between the two periods. From the perspective of ARI, not only was the overall informational structure preserved, but the effective assignment of indicators to clusters

remained almost unchanged. This stability reflects a process of forced homogenization that emerged as a response to the financial crisis. Following the shock of 2007–2009, economic and institutional mechanisms were reorganized under common constraints, while public policies increasingly generated similar responses across multiple domains. Indicators not only evolved in the same direction, but also maintained the same structural combinations. The convergence observed during this interval was therefore functional and institutional in nature, resulting from the necessity of stabilizing the system rather than from an organic convergence of economic fundamentals.

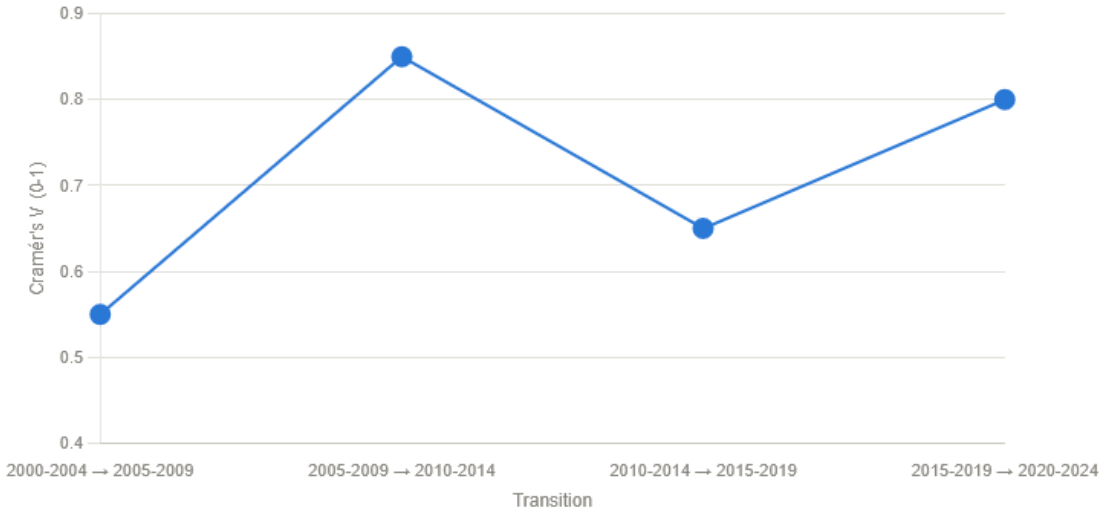
The decline in ARI toward 0.36 for the transition 2010–2014 → 2015–2019 signals a significant reconfiguration of cluster structures. Although part of the post-crisis architecture persisted, indicators began to redistribute differently, reflecting the gradual erosion of the coherence previously imposed by common adjustment mechanisms. This period marks the re-emergence of internal differentiation, as economies responded unevenly to the recovery process, public policy priorities diversified, and social as well as political tensions increasingly affected the functioning of common institutional mechanisms. ARI suggests that the system could no longer be characterized as structurally stable, but rather as one in which the relationships among indicators were once again undergoing transformation. The European system increasingly adapted along differentiated trajectories, while the structural convergence characteristic of the immediate post-crisis period proved to be both fragile and temporary.

The transition 2015–2019 → 2020–2024 shows an increase in ARI to 0.49, suggesting the partial re-emergence of structural order. Indicators once again tended to cluster in a relatively coherent manner, although this coherence remained partial and context-dependent. This evolution reflects the impact of major external shocks, particularly the COVID-19 pandemic, which generated coordinated responses and similar policy interventions across multiple areas. Nevertheless, the ARI value remained below the maximum recorded previously, indicating that the structure did not achieve the same degree of stability, while differences in implementation capacity and economic resilience continued to persist among member states. From this perspective, the observed structural convergence was reactive rather than cumulative. The system aligned under conditions of pressure, but did not fully reconstruct a robust and durable common architecture.

The evolution of ARI confirms that structural stability within the European Union emerges predominantly during periods of severe constraint rather than as the outcome of a gradual and continuous convergence process. In the absence of systemic shocks, relationships among indicators tend to be reconfigured, while the system evolves along differentiated trajectories. Consequently, structural convergence within the EU appears discontinuous, fragile, and externally induced rather than an automatic consequence of economic integration.

The analysis is further complemented by the Cramer's V indicator, presented in Figure 5 and Table 5, which measures the intensity of association between cluster structures corresponding to successive periods. Unlike the other indicators, Cramer's V captures the strength of structural relationships without accounting for the direction of change. Its values therefore indicate the overall degree of systemic coherence, highlighting the extent to which relationships among indicators remain consistent over time.

Figure 5 – Evolution of Cramér's V between partitions (2000–2024)



Source: Authors'own computation in RStudio

Table 5. Cramér's V values for transitions between periods (2000–2024)

Period	CramerV
2000-2004 → 2005-2009	0.53
2005-2009 → 2010-2014	0.88
2010-2014 → 2015-2019	0.65
2015–2019 → 2020-2024	0.82

Source: Authors' own computation in RStudio

The Cramér's V value of 0.54 indicates a moderate degree of association, reflecting the existence of a significant yet incomplete structural connection between the two periods. The cluster structure characteristic of 2000–2004 did not disappear entirely during 2005–2009; however, the relationships among indicators were no longer sufficiently stable to support the existence of clear continuity. This value suggests that the transition was not chaotic, as recognizable structural patterns still persisted, although they were redistributed differently. In other words, the same indicators remained relevant, but the manner in which they were associated with one another changed substantially. The result effectively captures the character of a tense transitional phase in which the previous structure continued to influence the system without retaining its capacity to organize it coherently.

The transition 2005–2009 → 2010–2014 records the highest Cramér's V value in the series (0.89), indicating an exceptionally strong degree of structural coherence between the two periods. This result confirms that the 2010–2014 interval was constructed almost directly upon the structural architecture formed during 2005–2009. Although the intensity and magnitude of indicators evolved, the underlying logic governing the relationships among them remained nearly unchanged. In this context, Cramér's V captures a process of structural consolidation. Nevertheless, such a high degree of association does not necessarily imply genuine structural convergence, but may instead reflect a form of structural rigidity generated by common institutional constraints.

The decline in Cramér's V to 0.65 for the transition 2010–2014 → 2015–2019 indicates a clear weakening of structural coherence. Relationships among indicators were no longer preserved with the same degree of rigidity, while cluster configurations gradually began to reorganize. However, the value remained above the intermediate threshold, suggesting that the previous structure did not completely disintegrate. This transition therefore reflects a phase characterized by the relaxation of structural constraints and the re-emergence of differentiated dynamics among member states.

The significant increase in Cramér's V to 0.83 for the transition 2015–2019 → 2020–2024 indicates a strengthening of structural linkages among clusters. Indicators once again tended to group together in a relatively coherent manner, while elements of the previous structural configuration were partially preserved. Nevertheless, this strong association was not identical to the one observed during 2005–2014. Although the intensity of the relationships was comparable, the internal structure differed substantially, a conclusion also supported by the more moderate AMI and ARI values. Cramér's V therefore suggests that the system regained coherence, but on the basis of a different structural architecture adapted to a new economic and institutional context.

Overall, the evolution of Cramér's V demonstrates that the degree of structural convergence within the European Union fluctuates over time, alternating between phases of rigidity and phases of relaxation. Maximum coherence tends to emerge during periods in which the system is constrained to operate under common rules and coordinated mechanisms, whereas periods of normalization are generally associated with the weakening of relationships among indicators.

CONCLUSIONS

The results indicate that the evolution of the European Union, as reflected through the relationships among macroeconomic indicators, does not follow a clear and continuous process of convergence, but rather a sequence of structural changes shaped by specific context factors. Convergence does not emerge when economies evolve freely, but predominantly during crisis periods, when common constrains reduce disparities among member states. When these pressures diminish, differences tend to re-emerge, and the system becomes more fragmented once again. This implies that the stability observed in certain periods does not necessarily reflect a gennuine maturation of economic structures, but rather a temporary effect inducted by the prevailing external context. The analysis of macroeconomic indicators through similarity measures shows that convergence is not an automatic outcome of integration, but rather depends on the shocks experiences by the system. Raher than representing a cumulative and incremental process over time, the dynamics of the European Union highlight the system's capacity to reorganize repeatedly while maintaining its fundamental functional continuity.

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