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MACROECONOMIC STABILITY IN EUROPEAN COUNTRIES ACROSS SUCCESSIVE CRISES: A PENTAGON-BASED COMPOSITE INDEX APPROACH

Abstract

The COVID-19 pandemic, the energy and inflation shock, and the Russian–Ukrainian war have challenged macroeconomic stability in European countries while exposing the limitations of traditional, single-indicator assessments. This study aims to analyze the evolution and structural drivers of macroeconomic stability across successive crisis regimes in European countries by applying a pentagon-based composite index that captures the joint interactions among growth, inflation, fiscal balance, labor-market conditions, and external positions. The empirical analysis is based on annual macroeconomic data for European countries over 2019–2024 and employs policy-consistent distance-to-target normalization combined with a non-additive pentagon-area aggregation method. The results indicate that macroeconomic stability was relatively high before the shocks, with an average index value of approximately 0.61 in 2019, reflecting broadly balanced macroeconomic conditions. In 2020, stability collapsed to an average of about 0.15, driven primarily by the near-universal contraction in GDP growth and the deterioration of fiscal balances. A partial recovery followed in 2021, when the average index increased to around 0.35, but persistent fiscal imbalances prevented a full return to pre-crisis stability. In 2022, macroeconomic stability deteriorated again, with the average index falling to roughly 0.21 as inflation moved far outside the tolerance corridor in more than 90%. The subsequent period was characterized by heterogeneous and incomplete adjustment. By 2024, overall stability improved to an average of approximately 0.41 following the normalization of inflation. However, countries with chronic fiscal and external imbalances continued to exhibit low levels of stability, underscoring the non-compensatory nature of macroeconomic stability.

Keywords macroeconomic stability, composite index, systemic shocks, European economies, inflation and energy crisis, fiscal sustainability, pentagon-based approach

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INTRODUCTION

Macroeconomic stability has re-emerged as a central policy concern in European countries following an unprecedented sequence of overlapping shocks that have fundamentally altered the operating environment for economic governance (Maranzano & Romano, 2025; Koll & Watt, 2022). The COVID-19 pandemic triggered the deepest synchronous recession in the history of numerous countries worldwide and the European Union, sparking large-scale fiscal interventions, unconventional monetary policy, and the temporary suspension of fiscal rules. While these measures prevented a prolonged depression, they also left European economies with elevated public debt, heightened inflationary pressures, and increased vulnerability to subsequent shocks (IMF, 2022b, 2023; Usman & Gil-Alana, 2025). As a result, macroeconomic stability can no longer be interpreted as a static condition but must be understood as a dynamic and fragile balance across multiple interacting dimensions.

The outbreak of the Russian–Ukrainian war further intensified these challenges, transforming a post-pandemic recovery into a complex crisis environment characterized by energy price volatility, supply-chain disruptions, and heightened geopolitical uncertainty. Europe has been disproportionately affected by these shocks due to its dependence on imported energy and its deep integration into global trade networks (World Bank, 2022, 2023). Inflation surged well beyond historical norms, external balances deteriorated in several countries, and fiscal pressures re-emerged as governments expanded support for households and firms. These developments have exposed structural asymmetries in European economies and highlighted the limits of relying on single indicators, such as GDP growth or inflation alone, to assess overall macroeconomic resilience.

In response, the European Commission has increasingly stressed the need for an integrated and multidimensional approach to macroeconomic surveillance and policy coordination. Sustainable economic performance depends on the simultaneous stability of prices, public finances, labor markets, and external positions, particularly in an environment marked by recurrent shocks and heightened uncertainty (European Commission, 2023, 2024). This policy context creates a strong demand for analytical tools that can capture the joint configuration of macroeconomic conditions and identify systemic vulnerabilities that remain hidden in additive or compensatory indices. Against this background, developing and applying a pentagon-based composite index of macroeconomic stability is highly important, as it directly responds to current policy debates on resilience, crisis management, and long-term economic governance in Europe.

1. LITERATURE REVIEW

Macroeconomic stability has long been conceptualized as a multidimensional condition reflecting the balanced interaction of growth dynamics, price stability, fiscal sustainability, labor-market equilibrium, and external balance. Early growth-oriented frameworks emphasized the central role of output expansion as a foundation for long-term stability and development, while recognizing that unsustainable macroeconomic configurations ultimately undermine growth itself (Barro, 1991; Kolodko, 2000). Subsequent crisis-oriented research demonstrated that stability cannot be inferred from single indicators, as economies with strong growth performance may still be highly vulnerable to shocks due to fiscal, monetary, or external imbalances (Bordo et al., 2001; Briguglio et al., 2009). This strand of literature laid the conceptual groundwork for treating macroeconomic stability as a systemic and non-linear phenomenon rather than a purely cyclical outcome.

A major body of research has focused on the role of monetary policy frameworks and institutional design in preserving macroeconomic stability. Price stability has been identified as a core anchor of macroeconomic performance, with inflation control contributing to lower output volatility and improved policy credibility (Clarida et al., 1999; Clarida et al., 2000; Cecchetti & Krause, 2002; Favero & Rovelli, 2003). At the same time, labor-market conditions have been increasingly incorporated into stability assessments through equilibrium-based concepts such as the NAWRU, which links unemployment dynamics to inflationary pressures and fiscal sustainability (Hristov et al., 2017; Fontanari & Pariboni, 2022). These approaches underline that macroeconomic stability emerges from the interaction of policy regimes rather than from isolated policy instruments.

Fiscal policy has been identified as another critical pillar of macroeconomic stability, particularly in crisis management and post-crisis adjustment. Sustainable fiscal positions support macroeconomic resilience by reducing sovereign risk, stabilizing expectations, and preserving policy space during downturns (Baldacci et al., 2011; Filipova et al., 2025). Empirical evidence further suggests that excessive government expenditure volatility and poorly structured fiscal responses can amplify exchange-rate instability and inflationary pressures, thereby weakening overall macroeconomic balance (Ahmed, 2025; Obradovic, 2025). In this context, the composition of public expenditure and compliance with international commitments, particularly in so-

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cially sensitive sectors such as healthcare, have been shown to condition fiscal credibility and long-term stability (Megbowon & Zehirun, 2025). Recent studies also highlight the importance of debt security and fiscal credibility for investment attractiveness and financial stability, particularly in open and highly integrated economies (Borio et al., 2023; Abou Saad & Sagi, 2025; Zhuravka et al., 2025).

External balance and financial openness represent additional dimensions through which macroeconomic stability is shaped, especially under conditions of globalization and heightened uncertainty. Persistent current-account imbalances and volatile capital flows have been shown to increase vulnerability to external shocks and financial crises, even in economies with otherwise strong domestic fundamentals (Ho & Njindan Iyke, 2017; Erhart et al., 2018). The European Macroeconomic Imbalance Procedure reflects this understanding by explicitly linking internal and external stability dimensions within a unified surveillance framework (Erhart et al., 2018; Koll & Watt, 2022). Complementary evidence from emerging and developed economies confirms that savings behavior, financial integration, and exchange-rate dynamics jointly influence long-term stability outcomes (Bouyacoub, 2024; Alsubaie, 2025; Barzola-Castro et al., 2025).

An important methodological stream of the literature addresses the measurement of macroeconomic stability through composite indicators. Additive indices have been criticized for allowing compensation between weak and strong dimensions, potentially masking systemic vulnerabilities (Nardo et al., 2005; Zhou et al., 2006; Zhou et al., 2010). In response, non-additive and geometric aggregation methods have been proposed to better capture balance and interaction effects across the dimensions of economic performance (Mlachila et al., 2016; Raczkowski & Shachmurove, 2024). Recent European studies applying composite and forecasting-based approaches demonstrate that macroeconomic stability trajectories differ substantially across countries depending on structural characteristics, institutional quality, and crisis exposure (Comporek et al., 2021; Kuzior et al., 2024; Vysochyna et al., 2024).

The growing frequency and overlap of systemic shocks have further reshaped the literature on macroeconomic stability. The COVID-19 pandemic revealed how macroeconomic turbulence rapidly transmits to corporate balance sheets, public finances, and financial systems, producing long-lasting effects on stability (Adrian et al., 2023; Gajdosikova et al., 2025). The subsequent inflation and energy-price shock, compounded by the Russian–Ukrainian war, has intensified research on war-related macroeconomic disruptions, forecasting under extreme uncertainty, and resilience in conflict-affected economies (Anghel & Jones, 2023; Kuzior et al., 2023; Dobrovolska et al., 2024). These studies show that traditional stability indicators often fail to capture the asymmetric and cumulative effects of successive crises, particularly when behavioral, institutional, and security-related factors interact with macroeconomic fundamentals (Lyeonov et al., 2024a, 2024b; Brychko et al., 2025).

Recent interdisciplinary contributions further extend the concept of macroeconomic stability by linking it to social development, human capital, innovation capacity, and institutional resilience. The literature increasingly emphasizes that growth-enhancing structural transformations, including improvements in green total factor productivity, can strengthen macroeconomic stability by supporting sustainable output expansion while mitigating resource and environmental constraints (He et al., 2025). In addition, demographic and human-capital dynamics, including brain gain and skilled migration, have been shown to strengthen countries' resilience to macroeconomic shocks by supporting productivity, fiscal capacity, and long-term growth potential (Mishchuk et al., 2024). Additional research highlights the destabilizing effects of shadow economic activity, information shocks, and public-health crises on macroeconomic balance, reinforcing the need for integrated analytical frameworks (Tiutiunyk et al., 2022; Gondauri et al., 2025; Zahorodnia et al., 2025).

The literature demonstrates a clear evolution from single-dimensional and compensatory views of macroeconomic stability toward multidimensional, interaction-based frameworks that emphasize balance and systemic resilience. At the same

time, existing empirical studies often rely on additive indices or focus on isolated crises, limiting their ability to capture successive and overlapping shock regimes. This gap motivates the application of a pentagon-based composite index that explicitly operationalizes macroeconomic stability as a condition of simultaneous balance across key dimensions (Bates et al., 2014), thereby aligning measurement more closely with contemporary policy challenges in Europe.

The study aims to analyze the evolution and structural drivers of macroeconomic stability across successive crisis regimes in European countries by applying a pentagon-based composite index that reveals how growth, inflation, fiscal balance, labor markets, and external positions interact under systemic shocks.

2. METHODOLOGY

The empirical analysis relies on five normalized "distance-to-target" indicators capturing key dimensions of macroeconomic stability, complemented by a synthetic composite index constructed using a pentagon (radar-area) approach. Annual data are obtained from Eurostat and the IMF Data Explorer.

The indicator measures inflation stability. r_{HICP}, which evaluates deviations of the Harmonized Index of Consumer Prices (HICP) from a symmetric target of 2%, consistent with the ECB's price-stability objective (Quaglia & Verdun, 2025). The indicator is defined as

$$r_{HICP} = \max\left(0, 1 - \frac{|HICP - 2|}{d}\right), \quad (1)$$

where d represents the tolerance corridor, the indicator takes the value of 1 when inflation exactly meets the target and declines linearly as inflation deviates from it, reaching zero once deviations exceed the corridor. This specification ensures a symmetric penalty for both inflationary and deflationary pressures.

Price stability is defined in accordance with the Maastricht Treaty as the primary objective of EU monetary policy. While the Treaty does not specify an exact numerical inflation target, this objective has been operationalized by the ECB through a symmetric 2% HICP target over the medium term (Tatar & Wieland, 2025). Accordingly, inflation rates close to 2% are interpreted as consistent with price stability, while both deflationary and inflationary deviations are penalized in the composite macroeconomic stability index. Following the ECB's symmetric inflation target of 2%, price stability is operationalized using a symmetric deviation-based normalization. Inflation rates within the 1–3% range are treated as broadly consistent with price stability, while both deflationary and inflationary deviations are penalized. This approach is consistent with the ECB's monetary policy strategy (ECB, 2021) and standard loss-function formulations in modern monetary theory (Clarida et al., 1999; Cecchetti & Krause, 2002).

Real GDP growth is considered a positive component of macroeconomic stability, as higher growth rates are associated with higher income levels, stronger fiscal positions, and greater economic resilience. This assumption is consistent with standard growth theory (Barro, 1991; Kolodko, 2000) and EU policy objectives (European Commission, 2020), which explicitly identify balanced and sustainable economic growth as a core objective of macroeconomic governance. Formally, the normalization follows a "less-is-better" rule consistent with policy benchmarks, ensuring comparability with other stability dimensions.

Fiscal sustainability is captured by the indicator r_{fiscal}, constructed in a policy-consistent manner analogous to the unemployment stability measure. The indicator is based on the general government fiscal balance expressed as a percentage of GDP and reflects commonly accepted fiscal sustainability thresholds. Balanced budgets and fiscal surpluses are interpreted as indicators of very strong macroeconomic stability and are assigned a score of 1. Moderate deficits are treated as transitional deviations from the fiscal target and are penalized linearly. Specifically, the indicator declines from one to zero as the fiscal balance deteriorates from 0% to 3% of GDP, corresponding to the Maastricht reference value (Baldacci et al., 2011; European Commission, 2016). Deficits exceeding 3% of GDP are classified as fiscal instability and assigned a score of zero. Formally, the normalization is defined as:

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$$r_{fiscal} = \begin{cases} 1, & x \geq 0 \\ 1 - \dfrac{|x|}{3}, & -3 \leq x < 0. \\ 0, & x < -3 \end{cases} \quad (2)$$

This specification also follows a "less-is-better" rule grounded in EU fiscal governance benchmarks and ensures conceptual symmetry with the unemployment stability indicator.

In EU macroeconomic practice, labor market equilibrium is commonly assessed using the Non-Accelerating Wage Rate of Unemployment (NAWRU), defined as the unemployment rate consistent with stable wage dynamics (Lendvai et al., 2015; Hristov et al., 2017; Hristov & Roeger, 2020). NAWRU estimates are country- and time-specific and are not formal policy targets; rather, they serve as operational benchmarks for estimating potential output and the cyclical component of fiscal balances. Empirical estimates typically range between 4–6% for most core EU economies and 6–8% for several Southern European countries (OECD, 2022b).

Building on this framework, unemployment stability is operationalized using a policy-consistent, threshold-based approach that translates NAWRU-informed benchmarks into interpretable macroeconomic stability categories. Unemployment rates at or below 4% are interpreted as conditions of very strong macroeconomic stability, reflecting tight labor markets. Rates between 4% and 6% fall within the target range for full employment. Values between 6% and 10% indicate moderate labor-market tensions, while unemployment exceeding 10% is classified as macroeconomic instability. To formalise this classification, the unemployment component is defined as a piecewise linear function that assigns full stability within the optimal range and gradually penalises deviations beyond it:

$$r_{unemp} = \begin{cases} 1, & u \leq 4 \\ 1 - \dfrac{u-4}{6}, & 4 < u \leq 10, \\ 0, & u > 10 \end{cases} \quad (3)$$

where u denotes the unemployment rate expressed in percentage points. This specification ensures consistency with NAWRU-based interpretations while allowing for transparent and comparable measurement of labor-market stability across countries and over time. By combining policy-relevant thresholds with linear penalization outside the target range, the indicator captures both favorable labor-market equilibria and destabilizing unemployment dynamics, in line with EU macroeconomic surveillance practice.

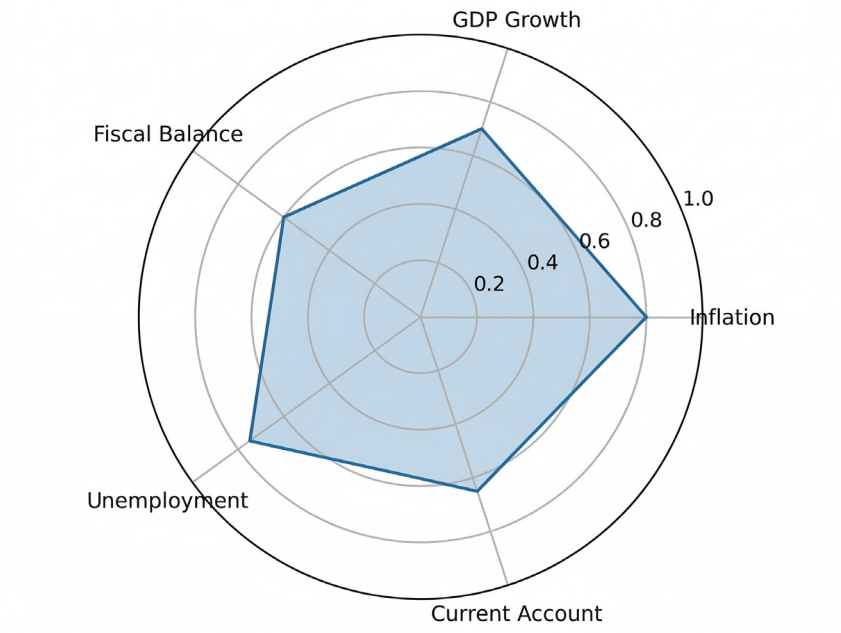
External balance conditions are assessed using the current-account stability indicator r_{CA}, which is constructed in a policy-consistent, threshold-based manner. The indicator is derived from the current-account net balance x expressed as a percentage of GDP. It reflects the principle that external sustainability is achieved when the balance remains close to zero. A value of one is assigned when the current-account balance lies within a narrow "near-balance" band between –1% and +1% of GDP, corresponding to conditions of very strong external stability. Moderate imbalances are tolerated within a broader corridor ranging from –4% to +6% of GDP and are penalized linearly. Current-account positions outside this corridor are deemed macroeconomically unstable and assigned a value of zero (Erhart et al., 2018; Phillips et al., 2013; OECD, 2022a; IMF, 2022a).

Formally, the normalization follows a symmetric distance-to-target rule around zero with asymmetric outer bounds and is defined as:

$$r_{CA} = \begin{cases} 1, & -1 \leq x \leq 1 \\ 1 - \dfrac{|x|}{6}, & -4 \leq x < -1 \ or \ 1 < x \leq 6, \\ 0, & x < -4 \ or \ x > 6 \end{cases} \quad (4)$$

where x denotes the current-account net balance as a percentage of GDP. This specification reflects the policy view that small external imbalances are largely benign, while persistent deficits or surpluses beyond the accepted corridor signal growing macroeconomic vulnerabilities. The indicator, therefore, ensures conceptual symmetry with other policy-consistent stability dimensions while allowing for asymmetric tolerance ranges commonly observed in external balance assessments.

The overall macroeconomic stability indicator, de-



Note: Each axis represents a normalized score (0–1) for one dimension of macroeconomic stability: inflation, GDP growth, fiscal balance, unemployment, and the current account balance. The composite macroeconomic stability index corresponds to the normalized area of the resulting pentagon. A collapse of any pillar reduces adjacent segments of the polygon and therefore shrinks the overall stability area.

Figure 1. Geometric representation of the pentagon-based macroeconomic stability index

noted *MSI,* is constructed as the normalized area of a pentagon formed by the five component indicators $\left(r_{HICP}, r_{GDP}, r_{fiscal}, r_{unemp}, r_{CA}\right)$ plotted on a radar chart. Unlike an arithmetic mean, this approach captures the multidimensional and interdependent nature of macroeconomic stability. The composite macroeconomic stability indicator is constructed using a non-additive aggregation rule based on the normalized area of a radar-chart polygon. Such geometric aggregation methods capture multidimensional balance and strongly penalize weak links, consistent with the composite-indicator literature and EU macroeconomic surveillance practice (OECD, 2008; Nardo et al., 2005; Zhou et al., 2006). The resulting index rewards balanced performance across all dimensions while strongly penalizing situations in which one or more components deteriorate sharply. As the area depends on the interactions among adjacent indicators, weaknesses in individual dimensions can substantially reduce the composite stability measure, reflecting the systemic nature of macroeconomic imbalances.

The pentagon representation provides a geometric interpretation of macroeconomic stability as the simultaneous balance of five macroeconomic dimensions. Each dimension is normalized to a score between 0 and 1 and plotted along a radial axis. Connecting the five points produces a pentagon whose area represents the composite stability index (Figure 1).

Detailed pentagon visualizations for individual countries are presented in Appendix B (Figures B1-B5).

3. RESULTS

3.1. Pentagon-based structural representation of macroeconomic stability

Figure 2 and Table A1 (Appendix A) summarize a five-pillar "pentagon" measure of macroeconomic stability, where each pillar is first converted into a score between 0 and 1 (inflation, GDP growth, fiscal balance, unemployment, current account), and the final index is the normalized pentagon area. Because the area is built from products of adjacent pillars, any pillar that collapses toward zero does not just lower the index slightly. It shrinks entire "sides" of the

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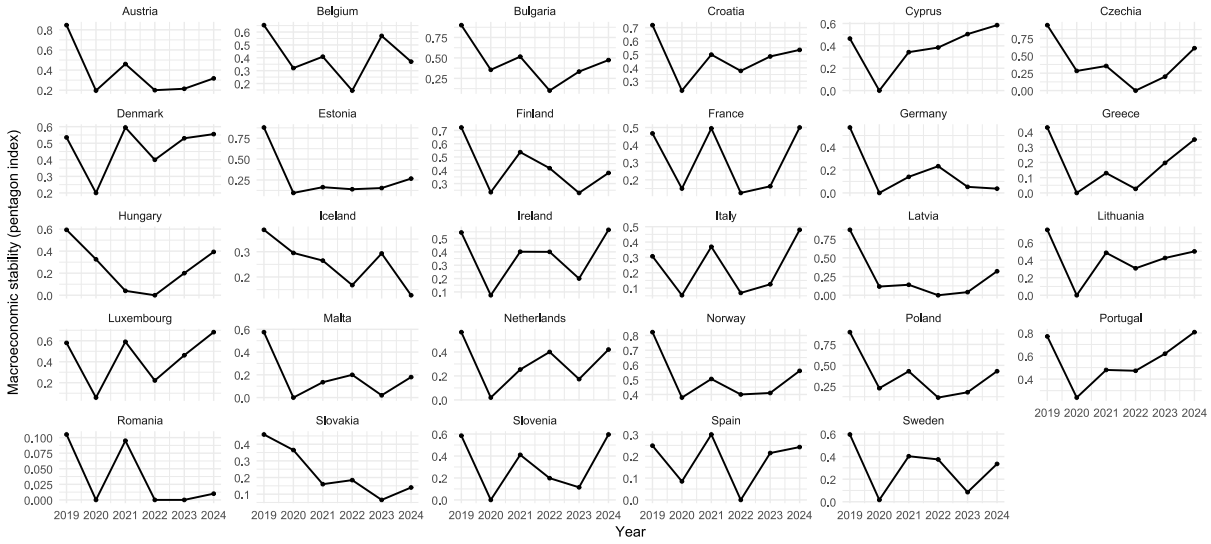

Figure 2. Evolution of pentagon-based macroeconomic stability indicators (MSI) across European countries

pentagon and can sharply reduce the overall stability measure. This is exactly why, for many countries, pronounced breaks in the trajectories can be observed in years when one component is coded 0 (especially GDP growth in 2020 and inflation in 2022).

Across the panel, 2019 stands out as the pre-shock benchmark year with comparatively high stability: the average MSI is about 0.613 (median 0.585), and several countries show scores close to the upper end (maximum 0.94). In practical terms, this implies that in 2019, many countries simultaneously met (or were close to) the target/corridor conditions across several dimensions: positive growth, manageable inflation, and acceptable labor-market and external positions. The small-multiple lines reflect this, with many countries starting from moderate-to-high levels before the sequence of shocks begins.

The largest common movement is the collapse in 2020, when the average MSI drops to around 0.149 (median 0.116), and the maximum is only 0.379. This outcome is mechanically consistent with the scoring rule for growth. In 2020, 96.6% of countries recorded severely weakened growth, implying $r_{gdp} = 0$ (growth ≤ 0), while fiscal deficits in 93.1% of countries resulted in $r_{fiscal} = 0$ (i.e., deficits worse than –3% or outside the scoring corridor). Because the pentagon is constructed from adjacent triangular segments, a zero-growth value eliminates two triangles from the polygon. When the fiscal pillar is also close to zero, the overall area becomes extremely small even if labor-market conditions remain relatively favorable.

The cross-country ranking in 2020 illustrates how the pentagon method rewards "balanced resilience" rather than strength in one area. The highest MSI in 2020 is Norway's (≈0.379), followed by Slovakia's (0.365) and Bulgaria's (0.355), indicating that, even if hit by a recession, these countries retained enough non-zero pillar combinations (for example, relatively supportive external balance and/or less severe deterioration in some dimensions) to preserve the pentagon area. By contrast, several countries record MSI equal to 0.0 in 2020 (e.g., Slovenia, Romania, Cyprus, Malta, and Lithuania), which typically reflects a configuration where at least one of the key adjacent products in the pentagon becomes zero repeatedly (most often because growth and fiscal and/or current account scores are zero).

The partial recovery in 2021 is visible both visually and in Table A1: the average MSI rises to about 0.348 (median 0.401), and importantly, *r_gdp* returns to 1 for all countries. However, the fiscal pillar remains a major drag: in 2021, 55.2% of the countries remained at *r_fiscal* = 0, meaning that although growth is positive again, the pentagon cannot fully "re-inflate" when deficits keep one side of the shape compressed. This is why many

country lines rebounded in 2021, but often to mid-range levels rather than returning to their 2019 values.

In 2022, the trajectories show another widespread deterioration, but for a different reason, as inflation dominates the picture: 93.1% of the countries have *r_infl* = 0 in 2022 (i.e., inflation moving beyond the corridor around the 2% target), so even with positive growth in most countries, the inflation vertex collapses and drags down two adjacent pentagon segments. The panel average MSI falls again to about 0.209 (median ≈0.198), which fits the intuitive expectation of an inflation/energy-price shock year where the economy may still expand. Still, macro stability, defined as "simultaneous balance", is compromised.

The 2023 pattern is more heterogeneous, including recovering as well as (still) weak indicators (average MSI ≈0.250, median 0.200), reflecting a combination of lingering inflation pressure and a renewed growth slowdown. Mechanically, the share with *r_infl* = 0 remains high at 48.3%, and *r_gdp* = 0 rises to 34.5%, so a substantial fraction of countries lose one or both of the "anchor" vertices again. This explains why several country lines remain flat at low levels or dip again after 2022 rather than showing a steady recovery.

By 2024, the dataset suggests a stronger rebound in overall stability (average MSI ≈0.406, median 0.420), as *r_infl* returns to non-zero levels for all the countries of the sample (0% with *r_infl* = 0). That inflation normalization change alone restores two sides of the pentagon, so that countries which keep growth positive and maintain at least moderate fiscal/external scores experience pronounced upward swings in indicators. The best-performing example is Portugal (MSI ≈ 0.807), where the component pattern is broadly balanced (inflation high score, growth positive, fiscal strong, unemployment relatively strong, and a supportive current account score), yielding a large pentagon area rather than a "lopsided" shape.

At the same time, 2024 also shows that the pentagon index is very sensitive to persistent structural imbalances. Romania is the clearest case: Its MSI is extremely low throughout (e.g., 0.105 in 2019, 0.000 in 2020, 0.095 in 2021, 0.000 in 2022–2023, 0.010 in 2024), caused by *r_fiscal* = 0 and *r_ca* = 0 in every single year, so even when growth and unemployment develop desirably, two vertices remain collapsed, and the pentagon area cannot expand. This is precisely the pattern of reaction to hope for from a "stability" indicator: It signals that macro stability is not just about growth and jobs, but also about the sustainability of public finances and external balance.

A second instructive example is Germany, which drops to very low values in 2023–2024 (about 0.053 and 0.037, respectively) despite a strong unemployment pillar, because the growth component is minimal (*r_gdp* = 0) in both recent years. The current account score is close to zero (indicating an external position far from the "near balance" band). Under the pentagon method, strong performance in one pillar cannot compensate for collapsed vertices elsewhere, so the index highlights "imbalanced stability." Altogether, the country trajectories therefore read as a narrative of three distinct macro-stability regimes in the sample: a high-stability pre-shock baseline (2019), a deep contraction and fiscal stress regime (2020), an incomplete recovery followed by a second, now inflation-dominated stability shock (2021–2022), and then a partial normalization, during which the countries of the sample diverge according to whether fiscal and external imbalances persist or not (2023–2024).

The outputs provide a comprehensive picture of macroeconomic stability dynamics across European countries, as measured by the pentagon-based index constructed from inflation, GDP growth, fiscal balance, unemployment, and the current account. Because the index is derived from the area of a pentagon, it captures not only the level of individual macroeconomic indicators but, crucially, their simultaneous balance. This implies that deterioration in a single dimension, particularly one adjacent to others in the pentagon, can substantially reduce the overall stability score, even if other indicators remain relatively strong.

3.2. Cross-country stability patterns: Heatmap evidence

Figure 3 presents a heatmap of the macroeconomic stability index across countries and years. Countries are ordered by their average MSI values over the entire period. Hence, countries with persistently lower stability appear at the top of

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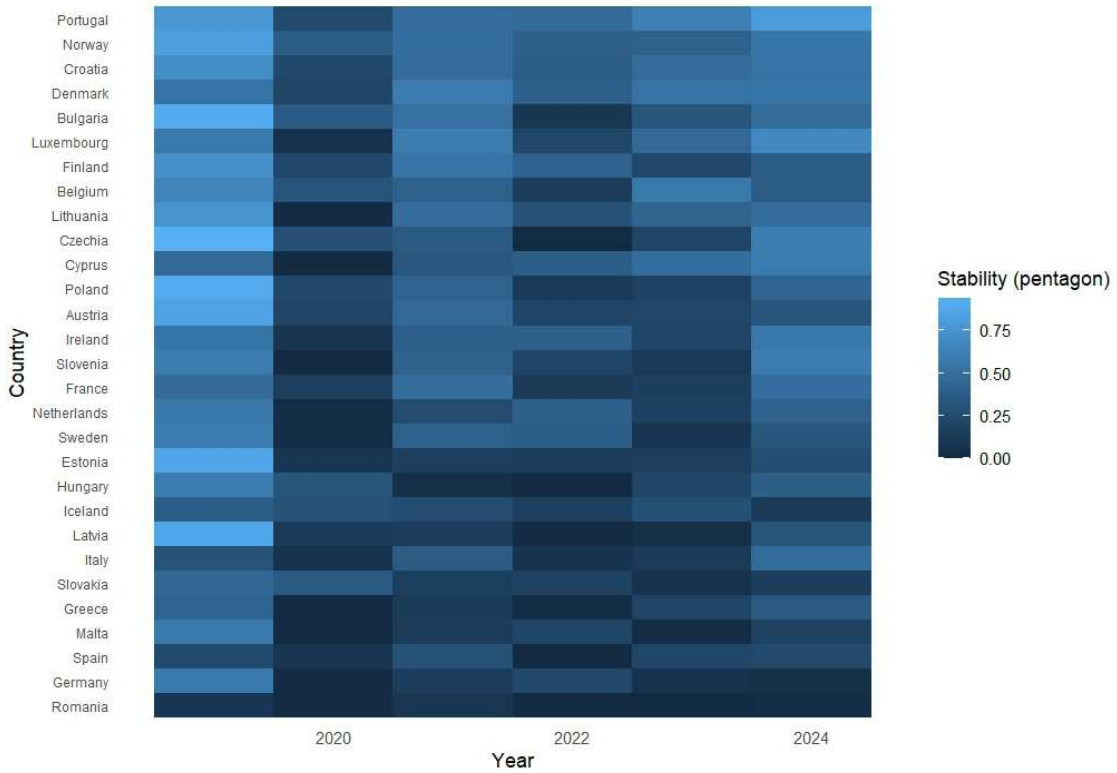
the panel, while those with higher stability appear toward the bottom. In this period, positive economic growth, moderate inflation, and comparatively stable labor-market conditions coexisted with manageable fiscal positions and external balances. As a result, the pentagon shapes for many countries were relatively "full," which is reflected in higher index values clustered in the mid-to-upper range. This confirms that, before the sequence of shocks, macroeconomic stability in Europe was broadly balanced rather than driven by a single favorable indicator.

A pronounced and synchronized decline in macroeconomic stability is observed in 2020, corresponding to the COVID-19 shock. The heatmap shows a near-universal shift toward low index values. Under the adopted methodology, GDP growth values of 0 or less are coded as 0, and in 2020, this condition applies to almost all countries. Given the pentagon's multiplicative nature, the collapse of the growth component alone eliminates two adjacent triangular areas, dramatically shrinking the overall index, even when unemployment or the current account remains relatively favorable.

The partial rebound visible in 2021 reflects the return of positive GDP growth in most countries, which mechanically restores one of the key pentagon vertices. However, the recovery in macroeconomic stability remains incomplete and uneven. The heatmap shows substantial cross-country variation, which can be traced back to persistent fiscal stress following large-scale pandemic support measures. More than half of the countries still record a fiscal component equal to zero in 2021, preventing a full re-expansion of the pentagon area despite the recovery in output.

In 2022, the macroeconomic stability indicator deteriorated again across a broad set of countries, but the underlying mechanism differed from that of 2020. This time, the dominant driver is the inflation component. Calculations



Note: The index ranges from 0 to 1 and is computed as the normalized area of a five-component pentagon that captures inflation, GDP growth, the fiscal balance, unemployment, and the current account. Countries are ordered by their average MSI value over the full sample period (2019–2024), from the least to the most macroeconomic stability. The color gradient represents the magnitude of the MSI, with lighter colors indicating lower stability and darker colors indicating higher stability.

Figure 3. Cross-country and temporal variation of macroeconomic stability (Pentagon index)

show that inflation exceeds the tolerance corridor for the vast majority of countries, resulting in an inflation score of zero. Even if growth remains positive, the collapse of the inflation vertex sharply reduces the pentagon area, underscoring how inflationary pressures lower the composite stability indicator's value even in the absence of a deep recession. The heatmap captures this effect as a renewed spread of lower-stability-index values across countries.

The 2023 pattern suggests a phase of fragile and incomplete adjustment. While inflation pressures ease in some countries, growth slows or turns negative in others, leading to a mixed configuration of component scores. The heatmap displays this as persistent heterogeneity, with some countries remaining trapped in low-stability regimes while others show modest improvement. This illustrates one of the key strengths of the pentagon approach: it shows that stability cannot be inferred from a single indicator alone, as improvements in one dimension may be offset by setbacks in another.

By 2024, the outputs indicate a broader recovery in macroeconomic stability, driven primarily by the normalization of inflation across all countries in the sample. Once the inflation component returns to non-zero levels, the pentagon area expands mechanically, especially for countries that also maintain positive growth and acceptable labor-market outcomes. However, the heatmap also makes clear that this recovery is asymmetric. Countries with persistent fiscal deficits or structurally weak current account positions continue to record relatively low stability scores, despite improvements in other areas.

The cross-country differences visible in the heatmap underline that the pentagon-based index is particularly sensitive to structural imbalances. Countries that consistently violate fiscal or external balance thresholds exhibit chronically low stability values throughout the entire period. This outcome is not a statistical artefact but a direct consequence of the methodological choice to treat macroeconomic stability as a condition for joint equilibrium rather than as a matter of compensatory trade-offs. In this sense, the index provides a stricter and more policy-relevant measure of stability than additive composite indicators.

The outputs demonstrate that European macroeconomic stability over the research period is characterized by three distinct regimes: a pre-shock equilibrium (2019), a deep instability phase driven first by recession (2020) and then by inflation (2022), and a gradual but uneven normalization thereafter. The heatmap and trajectories together show that recovery in macroeconomic stability is not automatic and depends critically on whether countries manage to restore balance across all key macroeconomic dimensions simultaneously. This interpretation directly reflects the calculations' structure and validates the pentagon method as a powerful diagnostic tool for comparative macroeconomic analysis.

3.3. Structural decomposition of stability: Pentagon visualizations

Figures B1–B5 of the appendix jointly provide a detailed visual decomposition of macroeconomic stability across European countries by displaying the underlying pentagon structures for selected benchmark years. Unlike aggregate trajectories or heatmaps, these figures allow direct inspection of which dimensions drive changes in the composite index and how the shape of macroeconomic stability evolves. The grouping into five panels is purely for visual clarity and does not affect interpretation; taken together, the figures cover the full country sample.

A first common pattern observable across almost all pentagons is the sharp contraction of the GDP growth vertex in 2020. Under the adopted binary normalization rule, non-positive growth values are coded as zero, resulting in the growth dimension collapsing for nearly all countries in that year. Because GDP growth is adjacent to both inflation and fiscal balance in the pentagon construction, its collapse removes two triangular areas simultaneously, leading to a pronounced shrinkage of the overall pentagon. This visual contraction confirms that rather than a structural break in the growth dimension, a marginal change drove the dramatic fall in the macroeconomic stability index in 2020.

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The figures further reveal that the 2021 pentagons expand asymmetrically across countries. Whereas the return of positive growth restores the GDP vertex almost universally, the fiscal balance dimension often remains compressed. In many countries, the fiscal score remains at or near zero, reflecting deficits above the adopted threshold. As a result, the pentagon regains width on the growth side. Still, it remains "cut" on the fiscal side, producing irregular, skewed shapes rather than a full recovery to the pre-crisis configuration. This explains why the composite index rebounds in 2021 but generally does not reach 2019 levels.

A second major structural shift is visible in 2022, when the inflation vertex collapses across nearly all countries. The pentagons of Figures B1–B5 show a pronounced inward movement of the inflation axis, often toward zero, reflecting inflation rates far outside the tolerance corridor used in the calculations. Importantly, this occurs even in countries of positive GDP growth. Visually, this shows that macroeconomic stability deteriorated in 2022, not because of recession dynamics, but because inflationary pressures prevented a balanced macroeconomic system. Almost all country pentagons exhibit a pronounced collapse of the inflation vertex, often contracting to zero, reflecting inflation rates far outside the tolerance corridor applied in the normalization. Importantly, this contraction occurs despite GDP growth remaining positive in most countries under the binary coding rule, which restores the growth vertex to its maximum value. The resulting pentagons therefore appear asymmetric rather than uniformly compressed: they retain width along the growth and, in many cases, unemployment dimensions, while being sharply "cut" on the inflation side. This configuration highlights that macroeconomic instability in 2022 is not primarily recession-based but stems from price instability, driven by energy price shocks and supply-side disruptions. Because inflation is closely linked to both GDP growth and the fiscal balance in pentagon construction, its collapse simultaneously removes two triangular areas, leading to a substantial reduction in overall pentagon area, even in otherwise resilient economies. The figures thus visually confirm that 2022 represents a structural break in macroeconomic stability driven by inflationary pressures rather than by output or labor-market deterioration. The pentagon method, therefore, clearly distinguishes the nature of instability in 2020 from that in 2022.

The labor market dimension (unemployment) appears comparatively stable across most figures and years. In many countries, the unemployment rate changes only gradually during crisis periods, indicating that labor markets adjust more slowly than other macroeconomic indicators or are partially cushioned by policy interventions such as labor-market stabilization programs. However, the figures also show that a favorable unemployment score alone is insufficient to preserve overall stability. Pentagons with a long unemployment axis but collapsed growth, inflation, or fiscal vertices remain small in area, reinforcing the non-compensatory nature of the index.

The current account dimension introduces persistent cross-country heterogeneity. Countries with chronically weak or highly imbalanced external positions display pentagons that are consistently "cut" on the current account side across all years. This structural feature explains why some countries exhibit persistently low macroeconomic stability scores even in years of positive growth and moderate inflation. The figures make this point particularly transparent by showing that, for these countries, the pentagon never becomes fully symmetric.

Comparing pre-crisis (2019) and post-adjustment (2024) pentagons highlights the incomplete and uneven nature of recovery. While inflation normalization in 2024 allows the inflation vertex to expand again across the sample, several countries still show compressed fiscal or current account dimensions. Consequently, even though the pentagon areas are visibly larger than in 2022–2023, they often remain distorted relative to 2019. This visual evidence supports the interpretation that post-shock macroeconomic stability is constrained more by structural imbalances than by cyclical factors alone.

In total, Figures B1–B5 demonstrate that no single dominant driver has characterized macro-

economic stability in Europe over the analyzed period. Instead, instability arises from different configurations of imbalances across time: growth collapse in 2020, inflation overshooting in 2022, and persistent fiscal or external constraints in the recovery phase. The figures are therefore essential for understanding why the composite index behaves as it does and for avoiding overly simplistic interpretations based solely on aggregate values.

4. DISCUSSION

The findings of this study are broadly consistent with, yet also extend, the existing literature on macroeconomic stability by demonstrating that stability in Europe during 2019–2024 was shaped less by individual macroeconomic indicators than by their joint configuration. Earlier studies emphasized the importance of economic growth and monetary stability as central anchors of macroeconomic performance (Barro, 1991; Clarida et al., 1999; Cecchetti & Krause, 2002). While the present results confirm that growth and inflation remain critical dimensions, they also show that strong performance in these areas cannot compensate for persistent fiscal or external imbalances. This non-compensatory outcome aligns with crisis-oriented research highlighting the systemic nature of macroeconomic instability (Bordo et al., 2001; Briguglio et al., 2009), but goes further by empirically illustrating how the collapse of a single pillar, such as GDP growth in 2020 or inflation stability in 2022, can disproportionately reduce overall stability, even when other indicators remain favorable.

The study's results also resonate with recent European-focused research that highlights the differentiated effects of successive crises on macroeconomic stability. Forecasting and post-pandemic analyses indicate that recovery paths across European countries are extremely uneven and strongly conditioned by fiscal space and structural characteristics (Kuzior et al., 2024; Vysochyna et al., 2024). The pentagon-based findings reinforce this view by showing that the partial rebound observed in 2021 was constrained by widespread fiscal deterioration, while the renewed decline in 2022 was primarily driven by inflationary pressures linked to energy markets and geopolitical disruptions. This pattern is consistent with evidence on the macroeconomic consequences of the COVID-19 shock and subsequent inflation surge, which affected corporate debt dynamics, public finances, and external balances across Europe (Gajdosikova et al., 2025; Erhart et al., 2018). At the same time, the results complement studies on war-related macroeconomic disruptions by demonstrating that the inflation shock associated with the Russian–Ukrainian war undermined stability even in economies that avoided a deep recession, echoing findings from conflict-affected and high-uncertainty environments (Dräger et al., 2025; Dobrovolska et al., 2024; Kuzior et al., 2023).

Finally, the findings contribute to the broader literature on the links between macroeconomic stability and structural, social, and long-term development factors. Previous studies emphasize the role of institutional quality, fiscal credibility, human capital, and sustainable growth patterns in enhancing resilience to shocks (Mishchuk et al., 2024; He et al., 2025). The present analysis supports these conclusions by showing that countries with persistent structural weaknesses, particularly chronic fiscal deficits or external imbalances, remained trapped in low-stability regimes even as inflation normalized in 2024. This outcome reinforces critiques of additive composite indicators, which may obscure such vulnerabilities through compensatory effects (Nardo et al., 2005; Zhou et al., 2006). By contrast, the pentagon-based approach confirms that macroeconomic stability should be interpreted as a condition of simultaneous balance, lending empirical support to recent methodological arguments in favor of non-additive and interaction-sensitive measurement frameworks (Raczkowski & Shachmurove, 2024).

This study has several limitations that point to relevant directions for future research. First, the pentagon-based macroeconomic stability index does not explicitly incorporate energy-market variables, such as electricity prices, volumes, and their specific volatility. It therefore captures the effects of the energy crisis only indirectly through inflation, growth, and fiscal balance.

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Given the central role of electricity prices in the post-2021 inflation surge and competitiveness losses in the EU (Coutinho & Licchetta, 2025), future research could extend the framework by adding an energy-related dimension or by interacting electricity price indicators with the index's existing pillars.

Second, the analysis does not explicitly account for cross-country differences in renewable energy source (RES) development and energy-transition policies. Since higher RES penetration can reduce exposure to external energy shocks and dampen price volatility over time but also lead to unusual patterns going as far as negative electricity prices (Biber et al., 2022; Aust & Horsch, 2020), future studies could integrate RES indicators or apply panel econometric methods to examine how green energy deployment conditions macroeconomic stability. Finally, the effectiveness of EU and national energy-crisis policies, such as price caps, subsidies, and market reforms, is not directly evaluated; future research could link such interventions to changes in the MSI using causal designs to assess their stabilizing role during energy crises.

CONCLUSION

This study aimed to analyze the evolution and structural drivers of macroeconomic stability in European countries across successive crisis regimes by applying a pentagon-based composite index that captures the joint interaction of growth, inflation, fiscal balance, labor-market conditions, and external positions under systemic shocks.

The empirical analysis relies on annual macroeconomic data for European countries over the period 2019–2024, covering the pre-shock baseline, the COVID-19 crisis, the inflation and energy-price shock, triggered by global supply-chain disruptions and the Russian–Ukrainian war, as well as the subsequent adjustment phase. Five policy-consistent, distance-to-target indicators were constructed for inflation, real GDP growth, fiscal balance, unemployment, and the current account, each normalized on a 0–1 scale using EU-relevant thresholds. These indicators were aggregated using a non-additive pentagon-area method, in which the composite macroeconomic stability index reflects the normalized area of a radar polygon, thereby strongly penalizing unbalanced performance and preventing compensation between weak and strong dimensions.

The results reveal pronounced and synchronized shifts in macroeconomic stability across Europe. In 2019, macroeconomic stability was relatively high, with an average index value of approximately 0.61 (median 0.59), reflecting broadly balanced growth, inflation, and labor-market conditions. In 2020, the index collapsed to an average of about 0.15 (median 0.12), driven primarily by the near-universal contraction in GDP growth, which was coded as zero for 96.6% of countries and mechanically eliminated two adjacent pentagon segments. A partial recovery occurred in 2021, when the average index rose to around 0.35, supported by the return of positive growth in all countries; however, more than half of the sample (55.2%) continued to record a zero fiscal score, preventing a full re-expansion of macroeconomic stability. In 2022, stability deteriorated again, with the average index falling to approximately 0.21, as 93.1% of countries recorded an inflation score of zero due to inflation rates far outside the tolerance corridor. The year 2023 was characterized by persistent heterogeneity and instability, with an average index of about 0.25, reflecting the coexistence of easing inflation in some countries and renewed growth slowdowns in others. By 2024, overall stability improved more visibly, with the average index increasing to around 0.41 (median 0.42), largely due to the normalization of inflation in all countries; nevertheless, countries with persistent fiscal deficits or chronically imbalanced current accounts continued to exhibit low stability scores, in some cases remaining close to zero despite positive growth and favorable labor-market conditions.

These findings carry several important policy implications. First, macroeconomic stability should be treated as a condition of simultaneous balance across key dimensions rather than as an out-

come achievable through strong performance in a single area, such as growth or employment. Policymakers should therefore avoid strategies that prioritize short-term output expansion with a narrow focus (e.g., on growth alone) while allowing fiscal or external imbalances to accumulate, as such configurations generate fragile, low-quality stability. Second, the results underline the central role of inflation control for systemic stability: the 2022 experience demonstrates that price instability can undermine macroeconomic balance even in the absence of a deep recession, highlighting the need for credible and coordinated monetary and fiscal responses to supply-side shocks. Third, persistent fiscal imbalances emerge as a major constraint on post-crisis recovery, suggesting that medium-term fiscal frameworks should be designed to restore sustainability once acute shocks subside, without abruptly undermining growth or labor-market resilience. Fourth, the strong penalization of external imbalances in the pentagon index indicates that macroeconomic governance in Europe should place greater emphasis on current-account sustainability, particularly in countries where structural deficits or surpluses persist across the cycle. Finally, the pentagon-based index itself can serve as a practical diagnostic tool for policymakers and public administrators, allowing them to identify which specific dimensions constrain overall stability and to design targeted, coordinated interventions rather than relying on aggregate indicators that mask underlying imbalances.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Macroeconomic stability index (Pentagon method), European countries, 2019–2024

Country	Year	r_infl	r_gdp	r_fiscal	r_unemp	r_ca	MSI
Austria	2019	0.875	1	1	1	0.723154	0.846182716
Austria	2020	0.85	0	0	1	0.529724	0.195998028
Austria	2021	0.8	1	0	0.95	0.85682	0.459886869
Austria	2022	0	1	0	1	1	0.2
Austria	2023	0	0	0.133333	1	0.937445	0.214155725
Austria	2024	0.775	0	0	1	0.893823	0.317307129
Belgium	2019	0.8	1	0.333333	1	1	0.653333333
Belgium	2020	0.6	0	0	1	1	0.32
Belgium	2021	0.7	1	0	0.925	0.826338	0.408559885
Belgium	2022	0	1	0	1	0.726162	0.145232324
Belgium	2023	0.925	1	0	1	1	0.57
Belgium	2024	0.425	1	0	1	1	0.37
Bulgaria	2019	0.875	1	1	1	0.868414	0.900655275
Bulgaria	2020	0.8	0	0	0.975	1	0.355
Bulgaria	2021	0.8	1	0	1	0.988629	0.515906276
Bulgaria	2022	0	1	0.033333	1	0.438551	0.101043475
Bulgaria	2023	0	1	0.333333	1	1	0.333333333
Bulgaria	2024	0.85	1	0	1	0.82132	0.473888322
Croatia	2019	0.7	1	1	0.85	0.672112	0.718354651
Croatia	2020	0.5	0	0	0.65	1	0.23
Croatia	2021	0.825	1	0.133333	0.625	1	0.498333333
Croatia	2022	0	1	1	0.8	0.106369	0.377019036
Croatia	2023	0	1	0.733333	0.975	1	0.484666667
Croatia	2024	0.5	1	0.366667	1	0.957205	0.533828187
Cyprus	2019	0.625	1	1	0.7	0	0.465
Cyprus	2020	0.225	0	0	0.6	0	0
Cyprus	2021	0.925	1	0.466667	0.7	0	0.343666667
Cyprus	2022	0	1	1	0.925	0	0.385
Cyprus	2023	0.525	1	1	1	0	0.505
Cyprus	2024	0.925	1	1	1	0	0.585
Czechia	2019	0.85	1	1	1	1	0.94
Czechia	2020	0.675	0	0	1	0.84296	0.282391546
Czechia	2021	0.675	1	0	1	0.651253	0.353169742
Czechia	2022	0	1	0	1	0	0
Czechia	2023	0	0	0	1	1	0.2
Czechia	2024	0.825	1	0.333333	1	0.851511	0.609134952
Denmark	2019	0.675	1	1	1	0	0.535
Denmark	2020	0.575	0	1	1	0	0.2
Denmark	2021	0.975	1	1	1	0	0.595
Denmark	2022	0	1	1	1	0	0.4
Denmark	2023	0.65	1	1	1	0	0.53
Denmark	2024	0.825	1	1	0.95	0	0.555
Estonia	2019	0.925	1	0.966667	1	0.798188	0.87896909
Estonia	2020	0.35	0	0	0.775	0.423125	0.09520318
Estonia	2021	0.375	1	0.166667	0.95	0.090395	0.163954629
Estonia	2022	0	0	0.666667	1	0.028922	0.139117772
Estonia	2023	0	0	0.1	0.9	0.752462	0.153443099
Estonia	2024	0.575	0	0.433333	0.6	0.913787	0.266739848
Finland	2019	0.775	1	0.7	0.8	1	0.722
Finland	2020	0.6	0	0	0.575	1	0.235
Finland	2021	0.975	1	0.1	0.575	1	0.5365
Finland	2022	0	1	0.933333	0.8	0.497691	0.415630586

Table A1 (cont.). Macroeconomic stability index (Pentagon method), European countries, 2019–2024

Country	Year	r_infl	r_gdp	r_fiscal	r_unemp	r_ca	MSI
Finland	2023	0.425	0	0.033333	0.7	1	0.229666667
Finland	2024	0.75	1	0	0.4	1	0.38
France	2019	0.825	1	0.2	0.4	1	0.466
France	2020	0.625	0	0	0.5	0.665621	0.14976479
France	2021	0.975	1	0	0.525	1	0.495
France	2022	0.025	1	0	0.675	0.855884	0.124823734
France	2023	0.075	1	0	0.675	0.985661	0.162849148
France	2024	0.925	1	0	0.65	1	0.5
Germany	2019	0.85	1	1	1	0	0.57
Germany	2020	0.6	0	0	1	0	0
Germany	2021	0.7	1	0	1	0	0.14
Germany	2022	0	1	0.366667	1	0.429909	0.232648416
Germany	2023	0	0	0.166667	1	0.097555	0.052844329
Germany	2024	0.875	0	0.1	1	0.045623	0.03710865
Greece	2019	0.625	1	1	0	0.832927	0.4291159
Greece	2020	0.175	0	0	0	0	0
Greece	2021	0.65	1	0	0	0	0.13
Greece	2022	0	1	0.133333	0	0	0.026666667
Greece	2023	0.45	1	0.533333	0	0	0.196666667
Greece	2024	0.75	1	1	0	0	0.35
Hungary	2019	0.65	1	0.333333	1	1	0.593333333
Hungary	2020	0.65	0	0	1	0.988573	0.326229102
Hungary	2021	0.2	1	0	1	0	0.04
Hungary	2022	0	1	0	1	0	0
Hungary	2023	0	0	0	1	1	0.2
Hungary	2024	0.575	1	0	1	0.88364	0.393346581
Iceland	2019	1	1	0.466667	1	0	0.386666667
Iceland	2020	0.8	0	0	1	0.820175	0.295263097
Iceland	2021	0.575	1	0	1	0.47581	0.264880252
Iceland	2022	0.075	1	0	1	0.710331	0.167721058
Iceland	2023	0	1	0.233333	1	0.9988	0.293093262
Iceland	2024	0.375	0	0	1	0.464328	0.127690281
Ireland	2019	0.725	1	1	1	0	0.545
Ireland	2020	0.375	1	0	1	0	0.075
Ireland	2021	0.9	1	0.566667	0.95	0	0.401
Ireland	2022	0	1	1	1	0	0.4
Ireland	2023	0.2	0	1	1	0	0.2
Ireland	2024	0.825	1	1	1	0	0.565
Italy	2019	0.65	1	0.5	0.025	0.553224	0.307185187
Italy	2020	0.475	0	0	0.175	0.412609	0.053639181
Italy	2021	0.975	1	0	0.125	0.792067	0.369254758
Italy	2022	0	1	0	0.475	0.72346	0.068728655
Italy	2023	0.025	1	0	0.575	1	0.125
Italy	2024	0.775	1	0	0.875	0.983493	0.479552756
Latvia	2019	0.825	1	0.933333	0.925	1	0.874333333
Latvia	2020	0.525	0	0	0.475	0.581459	0.11629188
Latvia	2021	0.7	1	0	0.6	0	0.14
Latvia	2022	0	1	0	0.775	0	0
Latvia	2023	0	0	0.2	0.875	0.037628	0.041584932
Latvia	2024	0.825	0	0.4	0.775	0.808449	0.320703832
Lithuania	2019	0.95	1	1	0.925	0.452494	0.744685257
Lithuania	2020	0.775	0	0	0.375	0	0
Lithuania	2021	0.35	1	0.633333	0.725	0.906119	0.483315513

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Table A1 (cont.). Macroeconomic stability index (Pentagon method), European countries, 2019–2024

Country	Year	r_infl	r_gdp	r_fiscal	r_unemp	r_ca	MSI
Lithuania	2022	0	1	0.766667	1	0	0.306666667
Lithuania	2023	0	1	0.766667	0.775	0.979825	0.424039476
Lithuania	2024	0.725	1	0.566667	0.725	0.546863	0.499090399
Luxembourg	2019	0.9	1	1	1	0	0.58
Luxembourg	2020	0.5	0	0	0.8	0.224977	0.058493994
Luxembourg	2021	0.625	1	1	1	0.201627	0.590528729
Luxembourg	2022	0	0	1	1	0.107588	0.221517628
Luxembourg	2023	0.775	1	0.766667	1	0	0.461666667
Luxembourg	2024	0.925	1	1	0.9	0.320921	0.682136198
Malta	2019	0.875	1	1	1	0	0.575
Malta	2020	0.7	0	0	1	0	0
Malta	2021	0.675	1	0	1	0	0.135
Malta	2022	0	1	0	1	1	0.2
Malta	2023	0.1	1	0	1	0	0.02
Malta	2024	0.9	1	0	1	0	0.18
The Netherlands	2019	0.825	1	1	1	0	0.565
The Netherlands	2020	0.775	0	0	1	0.055407	0.01966958
The Netherlands	2021	0.8	1	0.233333	1	0	0.253333333
The Netherlands	2022	0	1	1	1	0	0.4
The Netherlands	2023	0.475	0	0.866667	1	0	0.173333333
The Netherlands	2024	0.7	1	0.7	1	0	0.42
Norway	2019	0.925	1	1	1	0.616798	0.822467338
Norway	2020	0.8	0	0.146667	1	0.970885	0.378852082
Norway	2021	0.525	1	1	1	0	0.505
Norway	2022	0	1	1	1	0	0.4
Norway	2023	0.05	1	1	1	0	0.41
Norway	2024	0.8	1	1	1	0	0.56
Poland	2019	0.975	1	0.766667	1	1	0.896666667
Poland	2020	0.575	0	0	1	0.720328	0.226903369
Poland	2021	0.2	1	0.433333	1	0.899478	0.429208116
Poland	2022	0	1	0	1	0.575147	0.115029422
Poland	2023	0	1	0	1	0.892634	0.178526769
Poland	2024	0.575	1	0	1	1	0.43
Portugal	2019	0.575	1	1	0.85	1	0.77
Portugal	2020	0.475	0	0	0.725	1	0.24
Portugal	2021	0.725	1	0.066667	0.825	1	0.479333333
Portugal	2022	0	1	0.9	0.95	0.638407	0.472297415
Portugal	2023	0.175	1	1	0.875	1	0.62
Portugal	2024	0.825	1	1	0.875	0.784447	0.806712128
Romania	2019	0.525	1	0	1	0	0.105
Romania	2020	0.925	0	0	0.975	0	0
Romania	2021	0.475	1	0	1	0	0.095
Romania	2022	0	1	0	1	0	0
Romania	2023	0	1	0	1	0	0
Romania	2024	0.05	1	0	1	0	0.01
Slovakia	2019	0.8	1	0.6	1	0.162469	0.45848899
Slovakia	2020	1	0	0	0.825	1	0.365
Slovakia	2021	0.8	1	0	0.8	0	0.16

Table A1 (cont.). Macroeconomic stability index (Pentagon method), European countries, 2019–2024

Country	Year	r_infl	r_gdp	r_fiscal	r_unemp	r_ca	MSI
Slovakia	2022	0	1	0.466667	0.975	0	0.184333333
Slovakia	2023	0	1	0	1	0.327167	0.065433439
Slovakia	2024	0.7	1	0	1	0	0.14
Slovenia	2019	0.925	1	1	1	0	0.585
Slovenia	2020	0.425	0	0	1	0	0
Slovenia	2021	1	1	0	1	0.526441	0.410576216
Slovenia	2022	0	1	0	1	0.98977	0.197954058
Slovenia	2023	0	1	0.133333	1	0.306882	0.11470983
Slovenia	2024	1	1	0.7	1	0.289826	0.595930539
Spain	2019	0.7	1	0	0	0.776042	0.248645903
Spain	2020	0.425	0	0	0	1	0.085
Spain	2021	0.75	1	0	0	1	0.3
Spain	2022	0	1	0	0	1	0
Spain	2023	0.65	1	0	0	0.653508	0.214956018
Spain	2024	0.775	1	0	0	0.563345	0.242318509
Sweden	2019	0.925	1	1	0.775	0.162656	0.595303037
Sweden	2020	0.675	0	0	0.375	0.07877	0.016541626
Sweden	2021	0.825	1	0.933333	0.275	0	0.403
Sweden	2022	0	1	1	0.625	0.397654	0.37470671
Sweden	2023	0.025	0	0.7	0.575	0.037835	0.085040168
Sweden	2024	1	1	0.466667	0.4	0.015076	0.334887858

APPENDIX B. Country-level pentagon profiles of macroeconomic stability

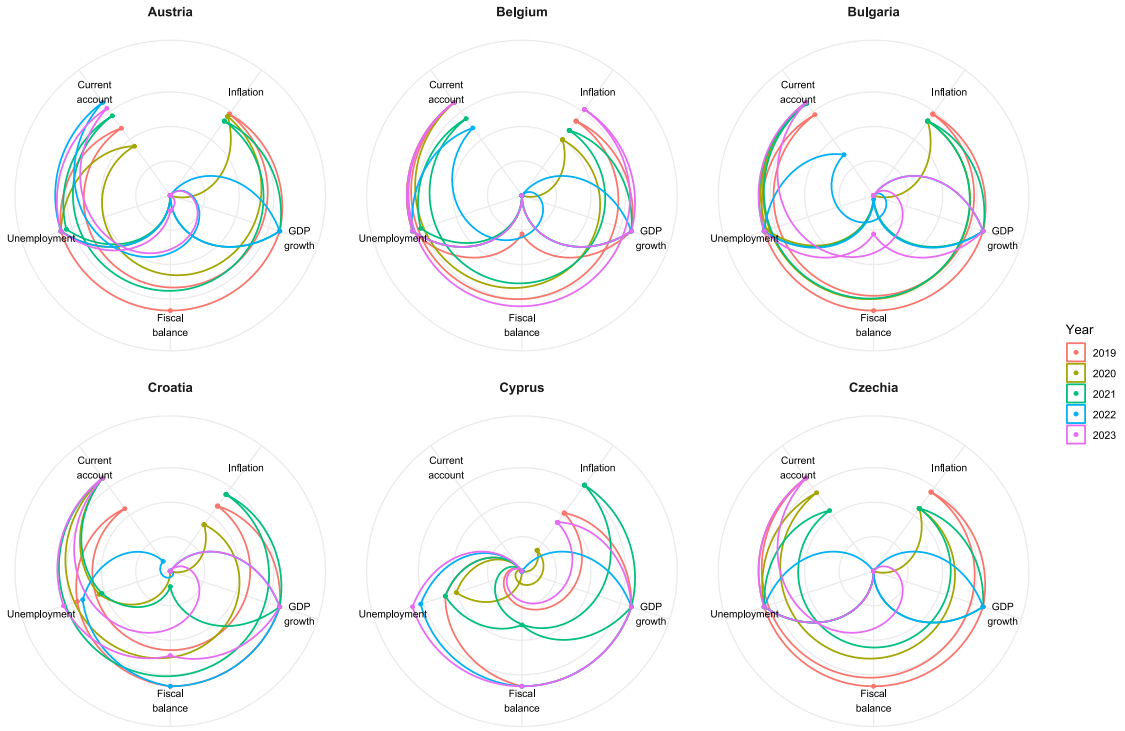

Figure B1. Macroeconomic stability pentagons for European countries (Group 1), selected years

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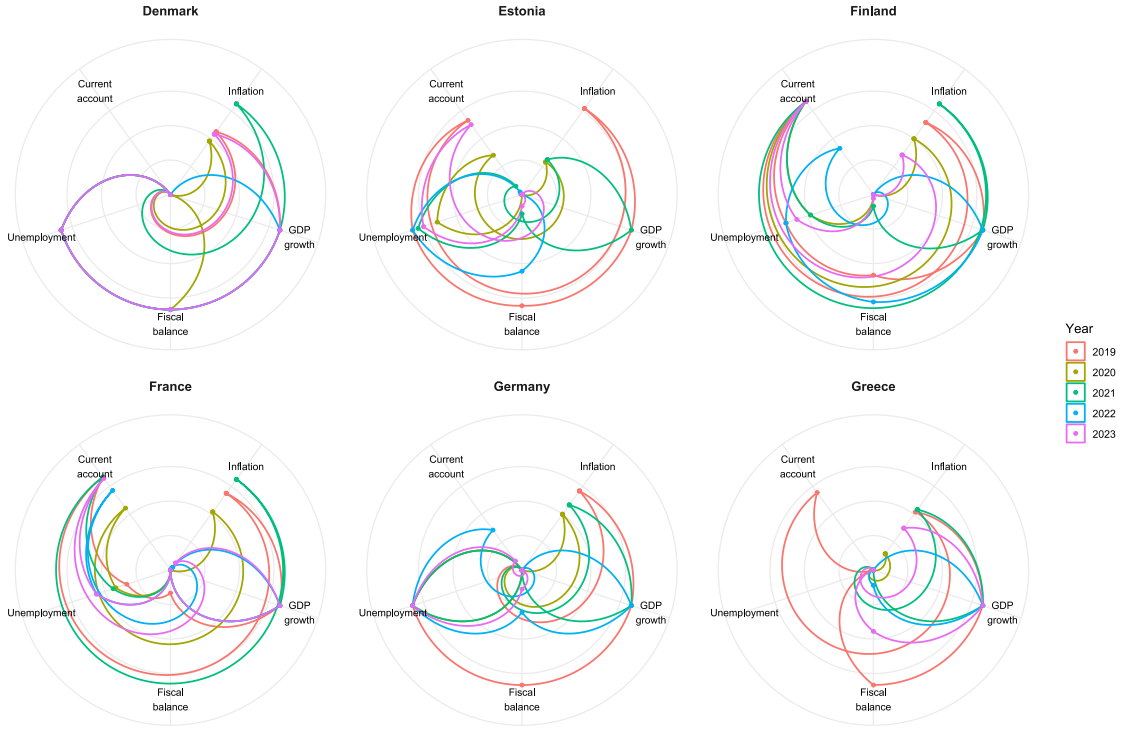

Figure B2. Macroeconomic stability pentagons for European countries (Group 2), selected years

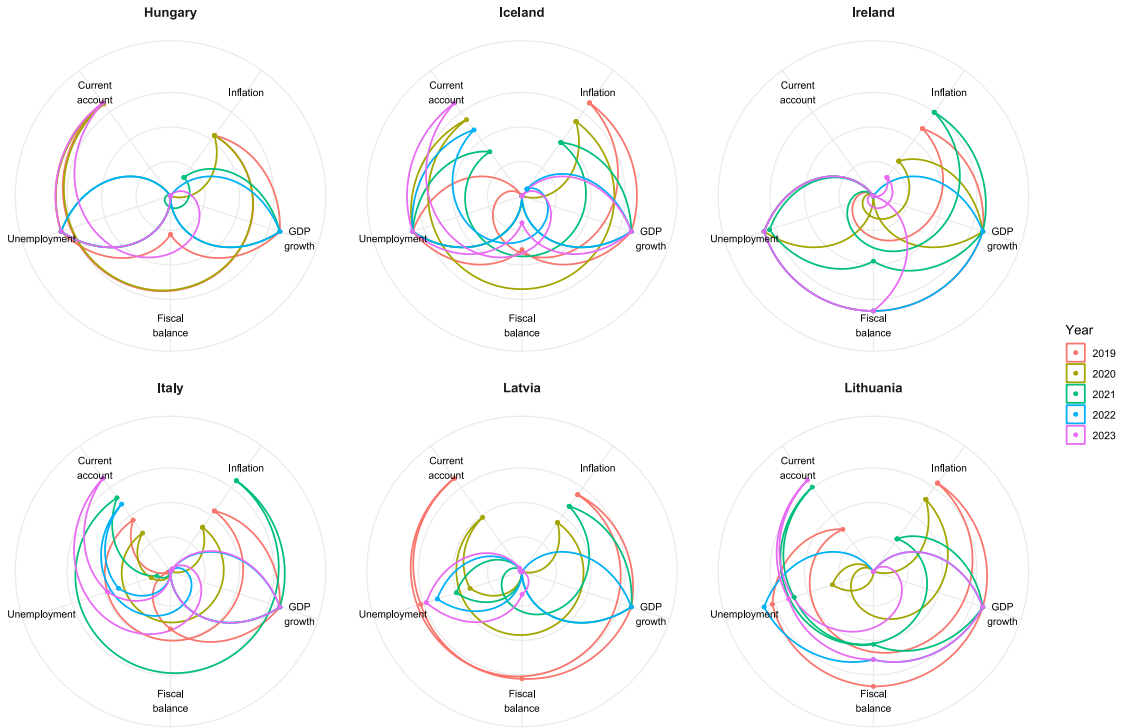

Figure B3. Macroeconomic stability pentagons for European countries (Group 3), selected years

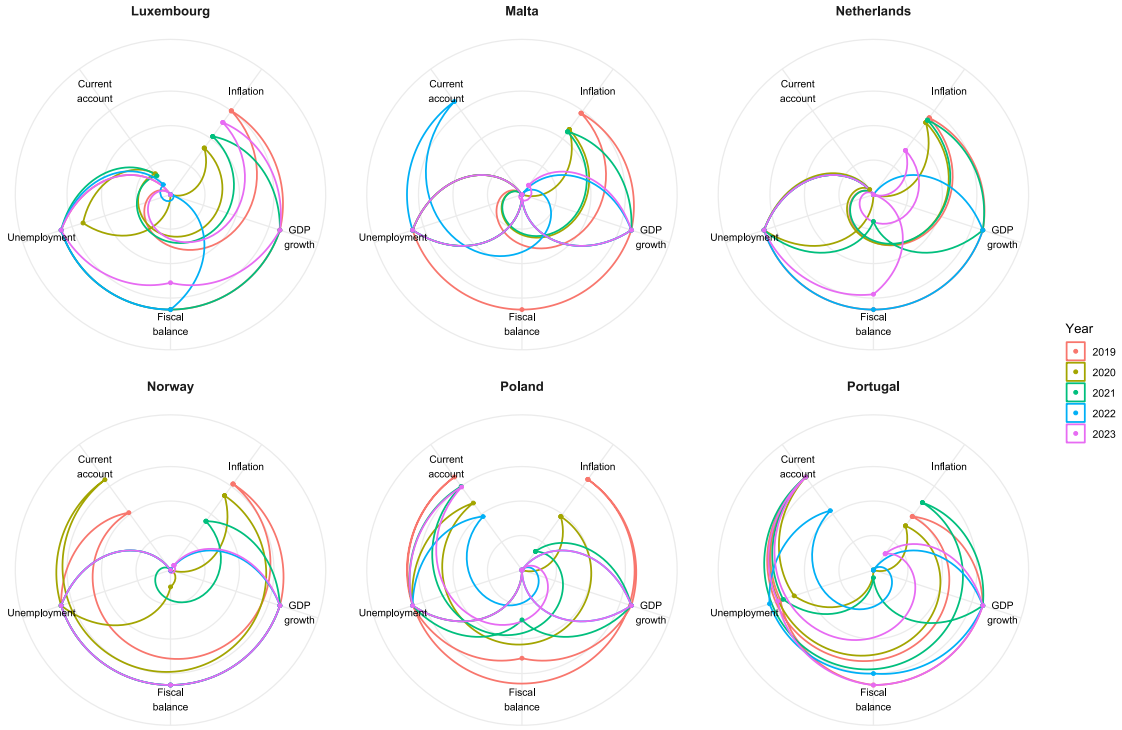

Figure B4. Macroeconomic stability pentagons for European countries (Group 4), selected years

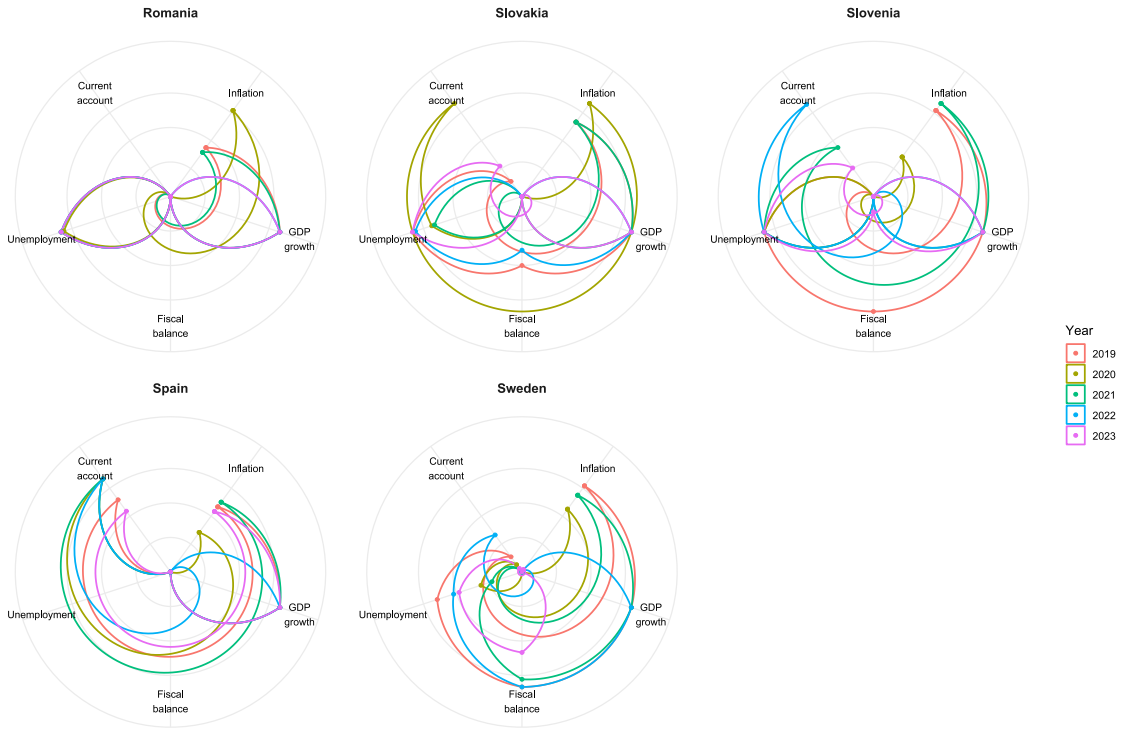

Figure B5. Macroeconomic stability pentagons for European countries (Group 5), selected years

http://dx.doi.org/10.21511/ppm.24(1).2026.44