






# “Assessing fiscal resilience in the EU during COVID-19: The public finance triangle”

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# ASSESSING FISCAL RESILIENCE IN THE EU DURING COVID-19: THE PUBLIC FINANCE TRIANGLE

**Abstract**

The COVID-19 pandemic represented a systemic shock to public finances in the European Union, as governments simultaneously faced revenue disruptions, expenditure pressures, and rapid debt accumulation. This study aims to identify and quantify the impact of the pandemic on public finances in European Union Member States and to assess fiscal resilience and long-term sustainability using the Public Finance Triangle, with particular emphasis on how stabilization policies affected its geometric area. The analysis is based on annual Eurostat data for all EU-27 countries covering the period 2011–2021. Year-on-year changes in public revenues, public expenditures, and public debt are integrated into a synthetic geometric indicator that captures their joint fiscal dynamics. The results show that in 2020, the average triangle area at the EU level declined from 14,518 units, representing the 2011–2019 average, to 12,777 units, which corresponds to a decrease of 11.99%. The strongest contractions were recorded in Estonia (–52.43%), Malta (–23.46%), and Lithuania (–22.45%), while the smallest declines were observed in Finland (–9.58%) and Sweden (–10.32%). In 2021, the average triangle area increased to 14,847 units, exceeding the pre-pandemic benchmark by 2.27%, and 20 out of 27 Member States surpassed their long-term averages. The strongest recoveries were observed in Cyprus (+14.34%) and Lithuania (+11.15%), with recovery driven primarily by public revenue dynamics. The findings confirm a universal deterioration of fiscal resilience in 2020 followed by a heterogeneous recovery in 2021, and provide policy-relevant implications for strengthening revenue capacity and ensuring sustainable debt management under future systemic shocks.

**Keywords**

fiscal resilience, debt, revenues, expenditures, indicator,  
triangle, pandemic, European Union

**JEL Classification**

H63, H62

**INTRODUCTION**

The COVID-19 pandemic represents one of the most significant systemic shocks to public finances in recent decades. Governments across the European Union implemented extensive fiscal measures to stabilize economic activity, support labor markets, and mitigate social consequences. These interventions resulted in a rapid increase in public expenditures, a substantial rise in public debt, and disruptions in public revenue collection, placing unprecedented pressure on the resilience and sustainability of public finance systems. The relevance of analyzing fiscal developments during the pandemic period is reinforced by the scale and simultaneity of these changes across European Union Member States. Unlike previous crises, the COVID-19 shock combined supply and demand disturbances with extraordinary fiscal responses, creating a unique environment for examining the behavior of public finance systems under systemic stress.

Despite the growing body of research on the fiscal consequences of the pandemic, existing analyses predominantly focus on individual fiscal indicators, such as budget balances, public debt ratios, or deficit levels. While these indicators provide important insights, they do not

fully capture the complex interactions among key components of public finances, which evolve simultaneously and are highly interdependent, particularly during periods of crisis. As a result, an important research gap persists in the comprehensive assessment of fiscal resilience and sustainability. The current analytical approaches do not sufficiently capture the joint dynamics of public revenues, expenditures, and debt, nor do they allow for consistent cross-country comparison under conditions of systemic shock.

This leads to a fundamental scientific problem: how to assess fiscal resilience and sustainability in a comprehensive and comparable way that reflects the simultaneous interaction of core fiscal variables across countries and over time, particularly in the context of a large-scale systemic disturbance such as the COVID-19 pandemic.

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## 1. LITERATURE REVIEW AND HYPOTHESES

The economic and fiscal consequences of the COVID-19 pandemic have generated an extensive body of research focusing on the role of public finances in mitigating systemic shocks and supporting economic recovery. Fiscal resilience and sustainability are increasingly conceptualized as multidimensional phenomena that reflect not only fiscal balances but also the capacity of public finance systems to absorb shocks, adapt to changing conditions, and maintain long-term stability. In the European context, recent contributions emphasize that post-pandemic fiscal policy must simultaneously address recovery needs, structural transformations, and emerging fiscal risks, particularly in relation to climate transition and macroeconomic stability (Herrero, 2022; Carraro et al., 2022; Turečková et al., 2023).

A significant strand of the literature examines the social and distributional effects of fiscal policy interventions during the pandemic. Empirical evidence consistently shows that discretionary fiscal measures, such as wage-subsidy schemes, employment protection programs, and income-support policies, played a crucial role in stabilizing household welfare and mitigating income inequality. At the same time, countries with more developed welfare systems and stronger automatic stabilizers exhibited more stable adjustment dynamics, highlighting the importance of institutional capacity in shaping fiscal resilience (Aspachs et al., 2021; Clark et al., 2021; Midões & Seré, 2022; Christl et al., 2023). Recent theoretical contributions further emphasize the role of quasi-automatic stabilizers and adaptive fiscal instruments in enhancing macroeconomic stability under uncertainty (Blanchard, 2025).

Another important research stream focuses on fiscal sustainability and public debt dynamics following large-scale shocks. The rapid expansion of public expenditures and borrowing during the COVID-19 crisis intensified concerns about long-term debt sustainability and fiscal risks. Existing studies highlight that fiscal sustainability is influenced not only by fiscal balances but also by macro-financial conditions, including interest rates, inflation, and the interaction between fiscal and monetary policy (Zahariev et al., 2021; Anghel et al., 2022; Blanchard et al., 2021; Kosterna, 2021; Checherita-Westphal et al., 2024; Blanchard, 2023). International institutions further emphasize rising vulnerabilities associated with high public debt levels and underline the need for credible fiscal frameworks and medium-term consolidation strategies (IMF, 2025; EC, 2026; OECD, 2025).

A growing body of literature highlights substantial cross-country heterogeneity in fiscal capacity and resilience within the European Union. Differences in institutional quality, fiscal governance, and debt-management capacity significantly influence recovery trajectories and adjustment mechanisms (Amato et al., 2021; Czezeli et al., 2020). At the same time, ongoing debates emphasize the need to reform fiscal rules in order to better accommodate crisis-related expenditures and long-term investment priorities (Babin et al., 2022; Cepparulo et al., 2023). The coexistence of national fiscal sovereignties within the European Union further complicates coordinated policy responses, reinforcing the importance of institutional integration and policy coordination (Zgaga, 2023). In addition, recent studies suggest that sustainable public finances depend not only on fiscal consolidation but also on the composition and growth-enhancing quality of public expenditures (Beldiman, 2024; Korcsmáros et al., 2024).

Methodological approaches to measuring fiscal performance represent another important research area. Traditional indicators, such as deficit-to-GDP or debt-to-GDP ratios, often provide only partial insights, particularly during periods of high volatility. In response, several studies propose composite indicators that integrate multiple fiscal dimensions into unified analytical frameworks, allowing for a more comprehensive assessment of fiscal performance (Cibik & Mikuš, 2022). However, these approaches frequently rely on complex weighting schemes or GDP-based measures that may distort cross-country comparisons under crisis conditions.

Recent literature also provides a stronger theoretical foundation for fiscal resilience as a core dimension of public finance management under uncertainty. Fiscal resilience is increasingly understood as the ability of governments to absorb shocks, adapt policies, and maintain long-term sustainability. This perspective emphasizes the importance of flexible fiscal frameworks, policy adaptability, and coordinated responses (Orszag et al., 2022; Rawdanowicz et al., 2021; Barbier-Gauchard et al., 2021; Arestis, 2021). At the same time, emerging research highlights the need to manage multiple overlapping risks, including economic, environmental, and geopolitical shocks, within integrated analytical frameworks (Hochrainer-Stigler et al., 2024).

The post-pandemic period has further intensified research on fiscal governance and resilience. The introduction of EU-level instruments, such as NextGenerationEU, has enhanced collective stabilization capacity while raising new challenges related to fiscal rules, debt sustainability, and institutional coordination (Capati, 2024; Amtenbrink, 2024; Truchlewski et al., 2025). At the same time, governments face increasing pressure to finance structural transformations, particularly in the areas of decarbonization and digitalization (Carraro et al., 2022; Herrero, 2022).

Emerging evidence also emphasizes the importance of coordination between fiscal and monetary policy, as well as the interaction between fiscal measures, inflation, and income distribution. These interactions highlight the increasing com-

plexity of policy frameworks and the need for adaptive and resilient fiscal systems (Goniewicz et al., 2023; Woźniakowski et al., 2023; Amores et al., 2025; Ascari et al., 2024; Kozlovskij & Burmistrov, 2025; Verdun, 2025; Fedajev et al., 2023).

Despite the breadth of existing research, an important analytical gap persists in the integrated assessment of fiscal resilience. Most studies analyze public revenues, expenditures, and debt separately, which limits the ability to capture their joint dynamics and reduces cross-country comparability, particularly under conditions of systemic shocks such as the COVID-19 pandemic.

Existing approaches provide valuable insights into individual fiscal components and policy responses; however, they lack a unified analytical framework capable of integrating these dimensions into a consistent and comparable measure of fiscal performance across countries and over time. This limitation creates a clear need for methodological approaches that allow for a comprehensive and multidimensional evaluation of fiscal resilience.

The aim of this study is to identify and quantify the impact of the COVID-19 pandemic on public finances in European Union Member States and to assess fiscal resilience and long-term sustainability through the Public Finance Triangle, with particular emphasis on how stabilization policies affected its geometric area.

Study hypotheses are as follows:

- H1: *In 2020, as a result of the initial shock caused by the COVID-19 pandemic, fiscal resilience and sustainability deteriorated across European Union Member States.*
- H2: *The fiscal impacts of the COVID-19 pandemic on resilience and sustainability differed significantly across European Union Member States during the period 2020–2021.*
- H3: *In 2021, the recovery of fiscal resilience was primarily driven by public revenue dynamics rather than by public expenditures and public debt.*

## 2. METHODOLOGY

This study applies a quantitative comparative approach to assess fiscal resilience and long-term sustainability in European Union Member States using the Public Finance Triangle, a synthetic geometric indicator integrating the joint dynamics of public revenues, public expenditures, and public debt. The methodological framework is based on the assumption that fiscal sustainability cannot be adequately captured by isolated indicators, as the condition of public finances depends on the simultaneous interaction of core fiscal aggregates.

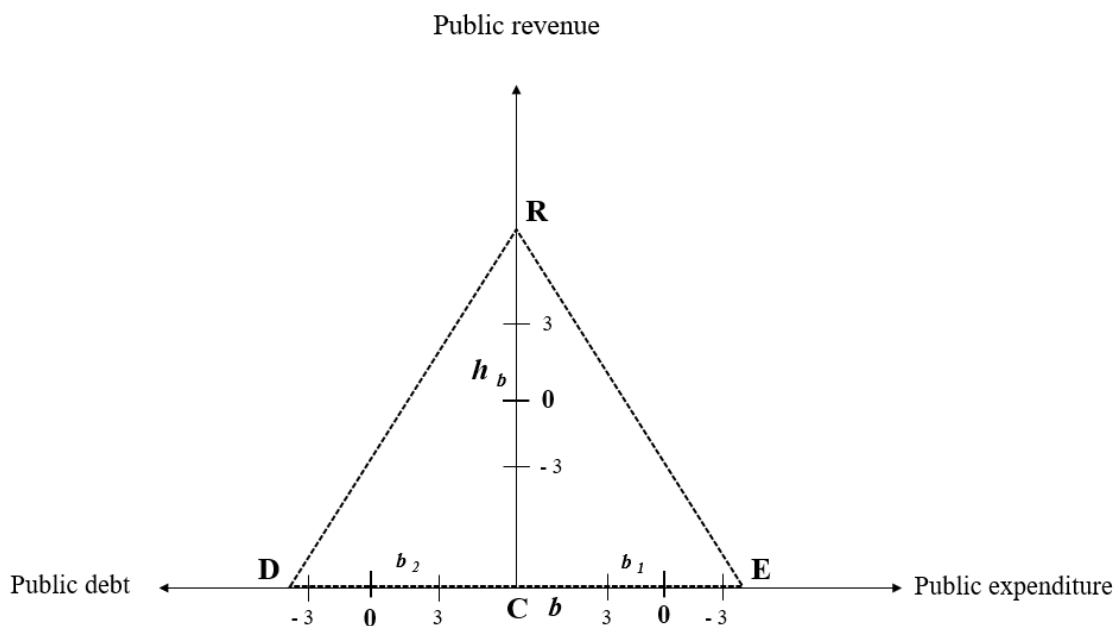
The conceptual design of the indicator is inspired by the multidimensional approach to macroeconomic assessment proposed by Kaldor (1971), adapted to the fiscal domain. The Public Finance Triangle reduces the analytical framework to three key dimensions and integrates them into a single geometric construct. The vertices of the triangle are defined by year-on-year changes in public revenues (R), public expenditures (E), and public debt (D).

The analysis is based on annual Eurostat data compiled under the ESA 2010 framework, ensuring a high level of cross-country comparability. The dataset covers all EU-27 Member States and the European Union aggregate over the period 2010–2021. Three variables are used: total general government revenues, total general govern-

ment expenditures, and consolidated gross public debt. All variables are expressed in absolute values (million euros) in order to avoid distortions associated with GDP-based indicators during periods of significant economic volatility, such as the COVID-19 crisis. The primary dataset consists of 1,008 observations. Based on these data, a secondary dataset of year-on-year percentage changes was constructed, resulting in 924 observations. Both datasets are publicly available in an open-access repository (Zenodo, 2026), ensuring transparency and reproducibility of the results.

The analytical procedure consists of several steps. In the first step, year-on-year percentage changes are calculated for each fiscal variable. These values capture the dynamics of fiscal development and serve as the basis for further transformation. In the second step, the calculated changes are transformed into the coordinates of the Public Finance Triangle. Public revenues define the vertical axis (height of the triangle), while public expenditures and public debt form the horizontal base. This configuration reflects the underlying logic of the indicator: increases in revenues expand the triangle area, whereas increases in expenditures and debt reduce it.

To ensure comparability across countries, a normalization constant is introduced. This constant must exceed the maximum observed year-on-year



**Figure 1.** Basic scheme of the fiscal triangle

change in the dataset. Given that the highest observed value is 114.78, the constant is set at 120. The constant is applied asymmetrically: it is added to revenue changes and subtracted from expenditure and debt changes. This transformation ensures positive coordinates and preserves the economic interpretation of the indicator.

Formally, the base of the triangle is defined as:

$$b = b_1 + b_2, \quad (1)$$

where  $b_1$  represents the expenditure component and  $b_2$  represents the debt component. The height of the triangle ( $h_b$ ) corresponds to the transformed revenue value. The area of the Public Finance Triangle is calculated as:

$$A = \frac{b \cdot h_b}{2}. \quad (2)$$

The resulting area represents a synthetic indicator of fiscal resilience. Larger values indicate more favorable fiscal configurations, while smaller values reflect weaker fiscal conditions. In the final step, triangle areas and vertex positions for the years 2020 and 2021 are compared with the average pre-pandemic configuration observed during the period 2011–2019. This benchmarking approach allows for the identification of the magnitude of the pandemic shock, cross-country differences, and recovery dynamics.

Several methodological limitations should be acknowledged. The indicator captures relative year-on-year changes rather than absolute fiscal levels and does not account for macroeconomic factors such as inflation, interest rates, or demographic trends. In addition, the normalization constant represents a simplifying assumption. Despite these limitations, the Public Finance Triangle provides a transparent and integrated framework for evaluating fiscal resilience under systemic stress.

### 3. RESULTS

The empirical analysis is based on annual Eurostat data for all European Union Member States over the period 2011–2021. For analytical purposes, three benchmark configurations are distin-

guished: the pre-pandemic period (2011–2019), the first year of the COVID-19 shock (2020), and the initial recovery phase (2021). The results are presented through two complementary outputs: the transformed positions of the Public Finance Triangle vertices (R, E, D) and the corresponding triangle areas.

In the pre-pandemic period, the European Union exhibited moderate and relatively stable fiscal dynamics. On average, public revenues increased by more than 3% annually, while public expenditures and public debt grew by 1.82% and 2.34%, respectively. Cross-country differences were pronounced. Malta, Bulgaria, and Estonia recorded the highest average revenue growth, whereas Greece exhibited a decline in revenues. Declining expenditure trends were observed only in Greece, Ireland, and Portugal. Germany was the only Member State with a long-term reduction in public debt, while Estonia, Slovenia, and Bulgaria recorded the highest debt growth.

The transformed positions of the Public Finance Triangle vertices are reported in Table 1. At the European Union level, the average pre-pandemic configuration was characterized by  $R = 123.12$ ,  $E = 118.18$ , and  $D = 117.66$ . In 2020, all three coordinates shifted inward to  $R = 116.17$ ,  $E = 111.11$ , and  $D = 108.86$ . In 2021, the positions moved outward again, reaching  $R = 129.43$ ,  $E = 115.01$ , and  $D = 114.41$ .

At the country level, the contraction of triangle vertices in 2020 varied significantly. The most pronounced decline in the debt-related vertex was observed in Estonia, where  $D$  decreased from 108.04 to 5.22. Substantial inward shifts were also recorded in Malta ( $R$ : 128.00 to 113.50;  $E$ : 112.86 to 100.55;  $D$ : 117.15 to 98.00) and Lithuania ( $E$ : 115.77 to 94.82;  $D$ : 113.48 to 88.41). In 2021, a general outward repositioning of vertices was observed across most Member States. Estonia recorded an increase in  $D$  to 111.42, Ireland exhibited a strong increase in  $R$  to 138.84, and Cyprus reached  $R = 137.02$  and  $D = 122.34$ .

The corresponding triangle areas are presented in Table 1. The average pre-pandemic area for the European Union amounted to 14,518 units. In 2020, this value declined to 12,777 units, representing a decrease of 11.99% relative to the 2011–

**Table 1.** Average positions of Public Finance Triangle vertices in EU Member States (2011–2021)

Years Countries	Area			The difference from the average	
	Average 2011–2019	2020	2021	2020	2021
European Union	14,518	12,777	14847	-11.99%	2.27%
Belgium	14,439	12,797	14895	-11.37%	3.16%
Bulgaria	14,290	11,971	14280	-16.23%	-0.06%
Czechia	14,631	12,194	13149	-16.66%	-10.13%
Denmark	14,639	12,356	15529	-15.59%	6.08%
Germany	14,747	12,723	14539	-13.72%	-1.41%
Estonia	14,035	6,677	15073	-52.43%	7.40%
Ireland	14,901	12,299	15838	-17.47%	6.29%
Greece	14,518	12,501	15027	-13.89%	3.51%
Spain	14,191	12,666	15248	-10.75%	7.44%
France	14,381	12,863	14748	-10.56%	2.56%
Croatia	14,397	12,446	15341	-13.55%	6.55%
Italy	14,374	12,718	14955	-11.52%	4.05%
Cyprus	14,158	11,940	16187	-15.66%	14.34%
Latvia	14,699	12,965	13363	-11.79%	-9.08%
Lithuania	14,479	11,228	16093	-22.45%	11.15%
Luxembourg	14,344	12,730	14948	-11.26%	4.21%
Hungary	14,554	12,614	14284	-13.33%	-1.86%
Malta	14,721	11,268	14127	-23.46%	-4.04%
Netherlands	14,654	12,939	14769	-11.70%	0.78%
Austria	14,579	12,382	14791	-15.07%	1.45%
Poland	14,644	12,337	15509	-15.76%	5.91%
Portugal	14,489	12,884	15433	-11.08%	6.51%
Romania	14,243	11,741	14463	-17.57%	1.55%
Slovenia	14019	12,066	15173	-13.94%	8.23%
Slovakia	14,457	12,470	14022	-13.75%	-3.01%
Finland	14,252	12,887	15109	-9.58%	6.01%
Sweden	14,483	12,988	15499	-10.32%	7.02%

2019 average. In 2021, the EU area increased to 14,847 units, exceeding the pre-pandemic benchmark by 2.27%.

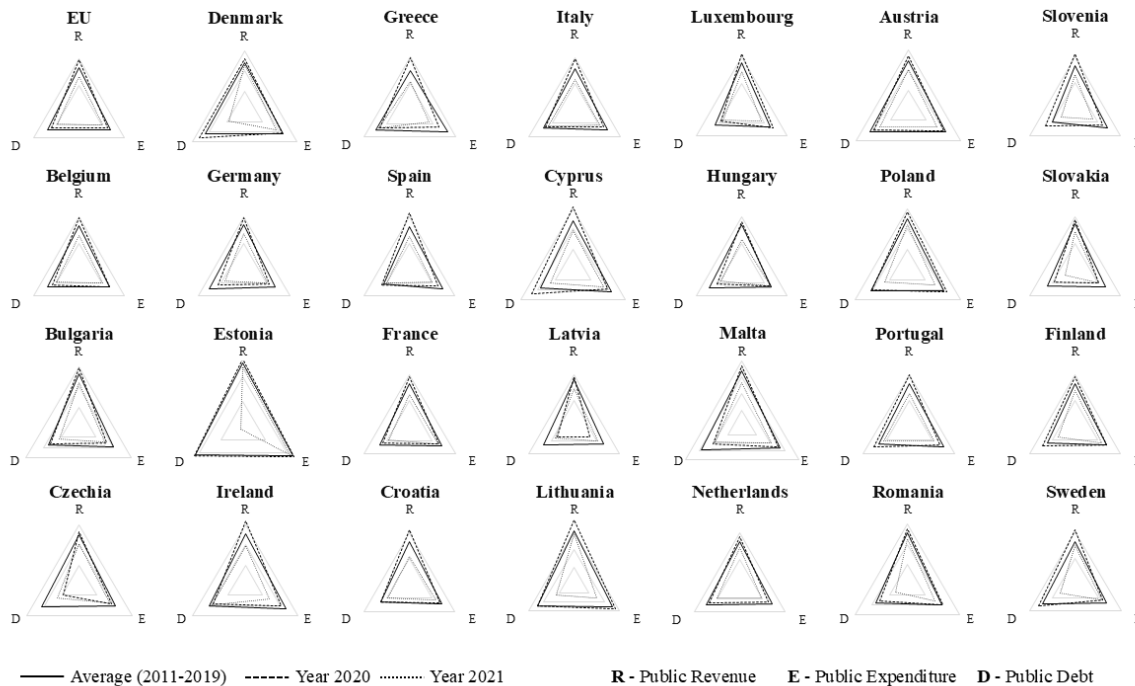
The contraction in 2020 was observed across all Member States. The largest relative declines occurred in Estonia (-52.43%), Malta (-23.46%), Lithuania (-22.45%), Romania (-17.57%), Ireland (-17.47%), Czechia (-16.66%), and Bulgaria (-16.23%). The smallest reductions were recorded in Finland (-9.58%), Sweden (-10.32%), France (-10.56%), Spain (-10.75%), and Portugal (-11.08%).

In 2021, the triangle area exceeded the pre-pandemic benchmark in 20 Member States as well as at the EU aggregate level. The highest positive deviations were recorded in Cyprus (+14.34%), Lithuania (+11.15%), Slovenia (+8.23%), Spain (+7.44%), Estonia (+7.40%), Sweden (+7.02%), Croatia (+6.55%), Portugal (+6.51%), Ireland (+6.29%), Denmark (+6.08%), and Finland (+6.01%). Seven Member States remained below

their pre-pandemic average: Bulgaria (-0.06%), Germany (-1.41%), Hungary (-1.86%), Slovakia (-3.01%), Malta (-4.04%), Latvia (-9.08%), and Czechia (-10.13%).

The increase in triangle areas in 2021 was accompanied by an upward movement of the revenue-related vertex in most Member States. At the EU level, the revenue vertex increased from 116.17 in 2020 to 129.43 in 2021, while the expenditure and debt components increased from 111.11 to 115.01 and from 108.86 to 114.41, respectively. Similar patterns were observed in countries with the strongest area expansion, including Ireland, Cyprus, Lithuania, Spain, and Sweden. The changes in the areas of the Public Finance Triangle across selected EU Member States in 2020 and 2021, relative to the 2011–2019 average, are illustrated in Figure 2.

The empirical findings allow for the evaluation of the proposed research hypotheses. The observed decline in triangle areas across all Member States



**Figure 2.** Changes in Public Finance Triangle areas across EU Member States in 2020 and 2021 (relative to 2011–2019 average)

in 2020 EU corresponds to *H1*. The substantial cross-country differences in both the magnitude of contraction in 2020 and subsequent changes in 2021 correspond to *H2*. The increase in triangle areas in 2021, accompanied by a stronger upward movement of the revenue-related vertex relative to expenditure and debt components, corresponds to *H3*.

## 4. DISCUSSION

The findings of this study provide a multidimensional perspective on the fiscal impact of the COVID-19 pandemic in European Union Member States and allow for a deeper interpretation of fiscal resilience as a dynamic and structurally conditioned phenomenon. The results confirm that fiscal resilience cannot be understood solely as a short-term response to crisis, but rather as an outcome of the interaction between pre-existing fiscal conditions and the nature of the external shock.

First, the analysis demonstrates that pre-pandemic fiscal configurations played a crucial role in shaping the subsequent resilience of public finances. Countries that entered the crisis with relatively balanced fiscal structures – characterized by stronger revenue dynamics and more moder-

ate expenditure or debt growth – exhibited more stable adjustment patterns during the pandemic. This finding is consistent with previous research emphasizing the importance of fiscal space, institutional quality, and debt-management capacity in determining crisis outcomes (Amato et al., 2021; Barbera et al., 2023; Rawdanowicz et al., 2021), as well as with broader empirical evidence on persistent differences in fiscal sustainability across EU Member States (Brady & Magazzino, 2018; Konopka & Łapińska, 2025). The results, therefore, reinforce the view that fiscal resilience is path-dependent and embedded in long-term structural characteristics.

Second, the universal contraction of the Public Finance Triangle observed in 2020 indicates that the initial phase of the pandemic constituted a systemic fiscal shock affecting all Member States simultaneously. This pattern corresponds closely with existing empirical studies documenting simultaneous revenue disruptions, expenditure expansion, and rapid debt accumulation as governments implemented large-scale stabilization measures (Blanchard et al., 2021; Anghel et al., 2022; Zahariev et al., 2021). At the same time, these developments can be interpreted within the broader theoretical framework that conceptual-

izes fiscal policy as a key stabilization instrument under conditions of macroeconomic uncertainty (Blanchard, 2023; Blanchard, 2025). By capturing these developments through a unified geometric indicator, the present study extends the literature by offering an integrated representation of fiscal dynamics.

Despite this common pattern, the magnitude of fiscal deterioration varied significantly across countries. This heterogeneity indicates that the pandemic interacted with country-specific structural and institutional characteristics rather than producing uniform outcomes. The results are consistent with previous research highlighting differences in fiscal capacity, governance quality, and adjustment mechanisms across Member States (Czeczeli et al., 2020; Barbier-Gauchard et al., 2021; Woźniakowski et al., 2023), as well as with analyses emphasizing the coexistence of national fiscal sovereignties within the European Union (Zgaga, 2023). These findings confirm that fiscal resilience is inherently context-dependent and shaped by long-term institutional arrangements.

The results for 2021 indicate a partial but uneven recovery of fiscal resilience across the European Union. While the majority of Member States exceeded their pre-pandemic benchmarks, several countries remained below their long-term averages, reflecting incomplete adjustment processes. This pattern is consistent with post-pandemic analyses emphasizing the role of policy flexibility, coordinated EU-level support, and the transition from emergency interventions to more structured fiscal frameworks (Goniewicz et al., 2023; Kozlovskij & Burmistrov, 2025; Verdun, 2025). It also reflects broader institutional developments aimed at strengthening fiscal resilience through coordinated policy instruments (Herrero, 2022).

A particularly important finding concerns the drivers of fiscal recovery. The results indicate that the improvement observed in 2021 was predominantly driven by public revenue dynamics, which exhibited a stronger and more systematic recovery than expenditure and debt components. This finding supports the third hypothesis and aligns with recent research emphasizing the role of revenue-side mechanisms, economic

reopening, and the interaction between fiscal policy and macroeconomic adjustment (Amores et al., 2025; Ascari et al., 2024; Blanchard, 2025). At the same time, the persistence of elevated expenditure and debt levels in several countries highlights the asymmetric nature of fiscal adjustment and suggests that improvements in fiscal resilience do not necessarily imply full fiscal sustainability.

This distinction between short-term recovery and long-term sustainability is particularly relevant in the current macroeconomic context. The findings are consistent with recent literature indicating that post-pandemic fiscal adjustment remains constrained by high public debt levels, increasing financing needs, and structural investment pressures related to climate transition and economic transformation (Afonso & Coelho, 2025; Carraro et al., 2022; IMF, 2025). In this respect, fiscal resilience should be interpreted not only as the capacity to absorb shocks but also as the ability to maintain sustainable fiscal trajectories under evolving macroeconomic conditions.

From a methodological perspective, the findings confirm the analytical value of integrated multidimensional indicators in fiscal analysis. The Public Finance Triangle captures the joint dynamics of revenues, expenditures, and debt, enabling a more comprehensive assessment of fiscal performance than traditional single-variable indicators. This approach is consistent with broader theoretical perspectives emphasizing the multidimensional nature of fiscal resilience and the importance of managing complex and overlapping risks (Hochrainer-Stigler et al., 2024). At the same time, the results contribute to ongoing debates on the design of fiscal frameworks, investment strategies, and public-private financing mechanisms in the post-pandemic environment (Babin et al., 2022; Cepparulo et al., 2023). Overall, the findings demonstrate that the fiscal consequences of the COVID-19 pandemic extended beyond a temporary disruption and revealed deeper structural asymmetries in fiscal capacity across European Union Member States. The recovery trajectories observed in 2021 suggest that fiscal resilience is shaped by the interaction of revenue recovery, expenditure adjustments, and debt dynamics, as well as by evolving institutional and policy frameworks.

## CONCLUSION

The aim of this study was to identify and quantify the impact of the COVID-19 pandemic on public finances in European Union Member States and to assess fiscal resilience and long-term sustainability using the Public Finance Triangle.

The results confirm that the COVID-19 pandemic caused a systemic deterioration of fiscal resilience across all Member States. At the EU level, the average triangle area declined from 14,518 units in the pre-pandemic period (2011–2019) to 12,777 units in 2020, representing a decrease of 11.99%. The most pronounced contractions were observed in Estonia (−52.43%), Malta (−23.46%), and Lithuania (−22.45%), while the smallest declines occurred in Finland (−9.58%) and Sweden (−10.32%). In 2021, the average triangle area increased to 14,847 units, exceeding the pre-pandemic level by 2.27%, with 20 out of 27 Member States surpassing their long-term averages.

The findings indicate that the magnitude of the fiscal shock and subsequent recovery was strongly conditioned by pre-existing fiscal structures. Countries with stronger revenue dynamics and more balanced fiscal configurations exhibited more favorable adjustment patterns, while countries with weaker fiscal positions experienced deeper contractions and slower recovery.

A key result of the study is that the recovery of fiscal resilience in 2021 was primarily driven by public revenue dynamics. This suggests that revenue-side adjustments played a more important role in restoring fiscal stability than expenditure reductions or debt stabilization, while elevated public debt levels remain a constraint on long-term sustainability. From a policy perspective, the results imply that strengthening revenue capacity should be a central element of fiscal policy, particularly in the context of future systemic shocks. At the same time, maintaining sustainable debt trajectories and improving the efficiency of public expenditures remain essential for ensuring long-term fiscal stability. The findings also highlight the importance of integrated fiscal analysis, as the interaction between revenues, expenditures, and debt determines the overall resilience of public finance systems.

Future research should extend the analysis beyond 2021 to assess the persistence of these dynamics under changing macroeconomic conditions. Further studies may also incorporate additional variables, such as inflation or interest rates, and explore the applicability of the Public Finance Triangle in different institutional and regional contexts.

## AUTHOR CONTRIBUTIONS

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