Annals of "Dunarea de Jos" University of Galati
Fascicle I. Economics and Applied Informatics
Years XXXI – nº2/2025
ISSN-L 1584-0409 ISSN-Online 2344-441X
www.eia.feaa.ugal.ro

DOI https://doi.org/10.35219/eai15840409535

Fiscal Risk and Economic Impact in Romania: Constructing and Applying a Sustainability Index (2009–2024)

Carmen Ghelase★, Neculita Mihaela★★, Cosmin Aurelian Balan ★★★

ARTICLE INFO

Article history:
Received July 31, 2025
Accepted August 26, 2025
Available online September 2025

JEL Classification
H62, H63, H54, H50, E62, C43

Keywords:
Fiscal Sustainability, Public Debt, Budget Deficit, Public Investment, Financial Sustainability Index, Romania, Economic Resilience, Composite Indicator.

ABSTRACT

This study develops a Financial Sustainability Index (FSI) tailored to Romania, covering the period 2009–2024, in order to assess fiscal resilience through a multidimensional lens. The index integrates four standardized macro-fiscal indicators: public debt, budget deficit, public investment (GFCF), and capital expenditure ratio. These variables were selected based on their theoretical relevance and institutional use in evaluating long-term fiscal risk. All indicators were standardized using Z-scores, and the index was computed as a simple average, with directional adjustments reflecting their impact on fiscal sustainability. The results reveal three distinct phases in Romania's fiscal evolution: (1) strong investment-driven sustainability between 2009–2012, (2) deterioration due to insufficient public investment from 2013–2018, and (3) gradual recovery starting in 2020, peaking in 2024. The study demonstrates that a composite indicator provides deeper insights into fiscal performance, highlighting the importance of investment efficiency and expenditure composition. The FSI also proves useful in identifying structural imbalances and shifts in fiscal policy. The findings have implications for risk monitoring and policy design, particularly in the context of emerging economies and contemporary economic uncertainty.

1. Introduction

Over the past two decades, the concept of fiscal sustainability has gained increasing relevance in economic research and policy planning. Widely understood as the ability of the government to meet its current and future obligations without resorting to excessive debt accumulation or fiscal unsustainability, fiscal sustainability has become a cornerstone of macroeconomic governance, particularly in the context of the European Union (EU) (European Commission, 2021; IMF, 2011).

In emerging economies such as Romania, fiscal policy plays a critical function not just in macroeconomic stabilization but also in supporting long-term development through strategic public expenditure and sound debt management. (Barrios and Schaechter, 2009; OECD, 2022). However, traditional indicators such as public debt and budget deficit, though needed, prove insufficient to show the whole picture of fiscal resilience. Increasingly, scholars and institutions propose multidimensional approaches with comprehensive expenditure. Increasingly, scholars and institutions argue for multidimensional approaches that integrate expenditure quality**,** investment composition**,** and capital expenditure efficiency (IMF, 2014; Dziemianowicz et al., 2021).

This study introduces a composite Financial Sustainability Index (FSI) tailored to Romania's fiscal context between 2009 and 2024. The index incorporates four standardized indicators:

- public debt (% of GDP),
- budget deficit (% of GDP),
- public investment (GFCF, % of GDP),
- and capital expenditure ratio.

By integrating both traditional and qualitative dimensions of public finance, the FSI provides a more comprehensive assessment of fiscal performance over time. Furthermore, the study positions this index as a diagnostic tool for identifying structural weaknesses and recovery phases in Romania's fiscal governance, particularly around periods such as the post-crisis years (2010–2013) and the COVID-19 aftermath (2020–2022).

★, ★★, ★★★Dunarea de Jos University of Galati, Romania. E-mail addresses: carmen.pulbere@brd.ro (C. Pulbere – Corresponding author), neculitam@yahoo.fr (M. Neculita), cosmin@agroprogress.ro (C. A Balan).

The analysis contributes to the existing literature by offering a **country-specific, dynamic model** that aligns with global calls for better fiscal metrics, as recommended by institutions such as the IMF (2014), OECD (2008), and World Bank (2022). Its findings are also relevant for policy designers seeking to align fiscal frameworks with the principles of the European Green Deal and the EU's economic governance reform (European Commission, 2023).

This paper attempts to fill this gap by proposing a new composite indicator – the Financial Sustainability Index (FSI) – tailored to Romania's fiscal trajectory.

The research objectives and guiding research questions of the study are outlined in the following section.

Research Objectives

The overall objective of this study is to evaluate the fiscal sustainability of Romania for the 2009–2024 period by constructing a composite index based on a number of fiscal and investment-related indicators. Specific objectives are:

- To develop a Financial Sustainability Index (FSI) based on standardized indicators of public debt, budget
- deficit, public investment, and capital expenditure ratio.
- To map the evolution of fiscal risk and resilience over time using this index.
- To identify structural episodes of fiscal weakness or strength, e.g., post-crisis and post-pandemic.
- To assess the economic implications of fiscal performance and investment trends in the context of long-run public finance sustainability.

Research Questions

This study seeks to answer the following key questions:

- Is a composite fiscal index better suited than standalone indicators in evaluating the full scope of Romania's fiscal resilience?
- How has Romania's fiscal performance evolved between 2009 and 2024, especially in the context of major economic shocks?
- What is the relationship between Romania's public investment orientation (GFCF and capital expenditure ratio) and its overall fiscal resilience??
- Can the FSI help identify policy shifts or risk patterns that are not visible through conventional fiscal analysis?

2. Literature Review

The concept of fiscal sustainability has been the subject of broad theoretical and empirical examination, particularly since the global financial crisis in 2008 and the subsequent European sovereign debt crisis. Fiscal sustainability can be defined as the ability of a government to maintain current spending, taxation, and other policies without compromising its solvency or requiring radical policy adjustments in the future (Blanchard et al., 1990; IMF, 2011).

Traditional measurement has focused immensely on the ratios of public debt to GDP, as well as budget deficits, as the sole determinants of fiscal soundness (Bohn, 1998; European Commission, 2021). However, subsequent analyses emphasize the limitations of resorting only to these two. For the OECD (2008), the horizon of vision also needs to include the composition and quality of government spending, that is, particularly capital and investment spending that will shape long-term economic progress.

The International Monetary Fund (IMF, 2014) introduced the Public Investment Management Assessment (PIMA) tool, which highlights the importance of strategic and effective management of public investment. Similarly, Barrios and Schaechter (2009) point out that the quality of public finances — for instance, the alignment of spending towards productive assets — is an important determinant of long-run fiscal sustainability.

Several studies propose the development of composite fiscal indices that capture broader dimensions of sustainability. For instance, Dziemianowicz et al. (2021) advise using multi-indicator indexes that compile debt, deficits, public investment, and spending composition, arguing that they are superior diagnostic tools for evaluating fiscal policy. The European Commission's Fiscal Sustainability Report (2021) also recognizes the need to include long-term spending commitments and efficiency in investment within sustainability analysis.

However, few such indices have been constructed specifically at the national level for countries like Romania. Most existing literature focuses on EU-wide or global comparisons, with little emphasis on tailored fiscal performance monitoring. This gap motivates the present study, which introduces a customized Financial Sustainability Index (FSI) for Romania, drawing inspiration from both academic frameworks and institutional guidelines.

3. Selection of Variables

The selection of indicators used to construct the Financial Sustainability Index (FSI) in this paper is based on both theoretical validity and empirical precedent. All the variables were chosen because of their contribution to the measurement of a critical element of fiscal sustainability, as institutional guidelines and international research recommend.

• Public Debt (% of GDP): Fiscal sustainability in the long term is most often assessed based on debt levels. Excessive debt can negatively impact growth in the economy, crowd out public investment, and limit fiscal space (Blanchard et al., 1990; European Commission, 2021). Debt-to-GDP is thus a basis for any sustainability indicator.
• Budget Deficit (% of GDP): Fiscal balance directly influences short-run macroeconomic stability and the trajectory of public debt (Bohn, 1998). Persistent deficits are considered unsustainable other than to the extent that they are counterbalanced by strong investment performance or policies that promote growth (IMF, 2011).
• Public Investment (GFCF, % of GDP): Capital investment, rather than spending on consumption, maintains productivity and economic growth over the long term. The IMF Public Investment Management Assessment (PIMA) framework is premised on emphasizing that sound investment is a fundamental pillar of sustainable fiscal management (IMF, 2014). This is further supported by empirical findings indicating a positive relationship between investment in infrastructure and GDP growth (Barrios and Schaechter, 2009).
• Capital Expenditure Ratio (%): This variable captures the efficiency and prioritization of capital investment within overall public spending. A high ratio suggests that a government is not only investing but also allocating resources towards development-enhancing projects. The OECD (2008) notes that the composition of public expenditure is as important as its size when evaluating fiscal quality.

Table X below presents the primary macro-fiscal data used in constructing the Financial Sustainability Index (FSI). These variables were selected based on theoretical relevance and institutional use in fiscal sustainability assessments (IMF, 2014; OECD, 2022). The values cover the period 2009–2024 and are sourced from Eurostat.

Table 1. Macro-fiscal indicators used for index construction

Year	Debt_% of GDP	Deficit_% of GDP	Investment_Public % of GDP*	Capital_Expenditure_Ratio
2009	23.7	-8.3	5.8	14.76
2010	29.7	-6.9	6.1	15.56
2011	33.4	-5.5	5.9	15.49
2012	37.8	-3	5.5	14.91
2013	37.8	-2.5	4.4	12.29
2014	39.1	-1.2	4.2	11.83
2015	38	-0.6	3.6	10.03
2016	37.4	-2.5	3.6	10.34
2017	34.4	-2.6	2.5	7.44
2018	35	-2.9	3.4	9.91
2019	35.3	-4.3	4.2	11.63
2020	47.1	-9.2	4.1	9.88
2021	49.2	-7.1	4.1	10.3
2022	47.9	-6.4	4.4	10.81
2023	48.9	-6.6	5.4	13.3
2024	54.8	-9.3	5.7	13.1

Source: Eurostat (2024), author's own compilation.

- *General government gross debt (% of GDP), dataset [teina225]*
- *General government deficit/surplus (% of GDP), dataset [tec00127]*
- *General government gross fixed capital formation (GFCF), dataset [teina210]*
- *Total general government expenditure (% of GDP), dataset [tec00023]*
- *Capital expenditure data computed as a ratio of GFCF to total expenditure.*

Together, these four indicators provide a multidimensional view of fiscal health. Debt and deficits reflect constraints and imbalances, while investment and capital allocation capture forward-looking, growth-friendly fiscal behavior. The selection of these indicators reflects best practices recommended by the IMF, OECD, and European Commission, thereby strengthening the index's relevance and diagnostic accuracy (OECD, 2022; Dziemianowicz et al., 2021).

4. Methodology

1. Objective

The aim of this research is to build a Financial Sustainability Index (FSI) for Romania from 2009 to 2024 using a composite approach based on macroeconomic and fiscal theory. The index aims to quantify the

country's fiscal sustainability by aggregating different indicators representing debt pressure, fiscal balance, and investment in development-oriented spending.

2. Data and Indicators

The study uses annual time series data obtained from **Eurostat** and national fiscal statistics. The selection of indicators is based on previous studies on fiscal governance and sustainability (IMF, 2011; Dziemianowicz et al., 2021; OECD, 2022). The indicators used are:

- **Public Debt (% of GDP)** – a long-term indicator of fiscal risk (Eurostat, teina225)
- **Budget Deficit (% of GDP)** – measures the government's yearly balance (Eurostat, tec00127)
- **Public Investment – GFCF (% of GDP)** – captures productive investment in infrastructure (Eurostat, teina210)
- **Capital Expenditure Ratio (%)** – calculated as the share of investment in total public expenditure (Eurostat, tec00023)

The final year (2024) includes estimates based on current budgetary forecasts.

3. Standardization

To ensure cross-indicator comparability, the values were **standardized using Z-scores**, following the formula:

$$Z = \frac{\mathrm{X} - \mu}{\sigma}$$

Where:

X is the observed value,
μ is the mean of the series,
σ is the standard deviation.

This method is commonly used in composite index construction (OECD, 2008).

4. Directional Adjustment

Because higher debt and deficits represent weaker sustainability, their standardized values were inverted by multiplying by –1. In contrast, investment and capital expenditure were kept positive due to their development-enhancing role (Barrios & Schaechter, 2009; IMF, 2014).

5. Index Construction

The final Financial Sustainability Index was computed as the average of the four adjusted Z-scores:

$$FSI_t = \frac{-Z_{Debt_t} + \left(-Z_{Deficit_t}\right) + Z_{Investement_t} + Z_{CapitalExpenditure_t}}{4}$$

This additive model provides a single score for each year, enabling trend analysis.

6. Interpretation

- **Higher FSI values** represent stronger fiscal sustainability (lower debt or lower deficit, higher investment).
- **Negative values** indicate periods of fiscal imbalance or effects of diminished investment effort.
- The time series was analyzed to identify structural trends and recovery phases post-2008 crisis and post-2020 pandemic.

The constructed Financial Sustainability Index (FSI) provides a composite measure of Romania's fiscal resilience. Higher values reflect a stronger fiscal stance, based on lower debt and deficit, and higher developmental expenditure. The index reveals structural weaknesses during periods of low public investment and increasing debt, especially in 2017–2018, followed by a post-crisis recovery in 2023–2024.

Financial Sustainability Index – Romania (2009–2024):

The calculated Financial Sustainability Index (FSI) for Romania gives an aggregate image of the fiscal robustness of the country in terms of debt, budget deficit, public investment, and capital expenditure ratio.
The highest FSI scores are recorded for 2010 and 2024, pointing to structural efforts to align fiscal balance with development-sensitive expenditures. Contrarily, 2017 and 2018 have worst fiscal sustainability, through declining capital expenditure amid moderate deficits.

The index is made up of four essential fiscal indicators—public debt, budget deficit, public investment, and capital expenditure ratio—normalized and averaged to represent the country's overall fiscal condition. Three phases of trends are identified:

•2009–2012: High FSI values, driven by strong public investment amid high budget deficits, reflecting a supportive fiscal attitude during recovery.
• 2013–2018: A sharp deterioration in the FSI, reaching its lowest points in 2017 and 2018. This reflects a loss of fiscal sustainability due to declining capital investment and increasing structural debt pressures
•2019–2024**:** a steady upward trend, because of the increased public investment and improved allocation of government expenditure. The significant improvement observed in 2024 indicates a return to fiscal discipline and a strategic emphasis on development, potentially driven by EU funding mechanisms and post-pandemic recovery measures.

Overall, the FSI highlights Romania's fluctuating fiscal sustainability, emphasizing the importance of long-term investment and efficient fiscal governance.

5. Results and Economic Impact

In order to assess the evolution of fiscal sustainability in Romania over the 2009–2024 period, a composite Financial Sustainability Index (FSI) was computed.

The index integrates four key standardized fiscal indicators and offers a synthetic score for each year. Table 2 presents the evolution of the Financial Sustainability Index (FSI) for Romania, alongside a qualitative interpretation of each value. The index confirms a clear deterioration in fiscal resilience during 2014–2018 and a modest recovery starting in 2023.

Table 2. Financial Sustainability Index and Interpretation

Year	Z_Debt	Z_Deficit	Z_Investment	Z_Capital	FSI	Interpretation
2009	-1.91227	-1.1876	1.1767	1.1727	5.4493	Strong financial sustainability
2010	-1.17884	-0.6941	1.4605	1.5094	4.8428	Strong financial sustainability
2011	-0.72656	-0.2005	1.2713	1.4799	3.6783	Strong financial sustainability
2012	-0.18871	0.6808	0.8928	1.2358	1.6365	Moderate financial sustainability
2013	-0.18871	0.8571	-0.1478	0.1331	-0.6831	Low or weak financial sustainability
2014	-0.0298	1.3154	-0.337	-0.0605	-1.6831	Low or weak financial sustainability
2015	-0.16426	1.5269	-0.9047	-0.8181	-3.0854	Low or weak financial sustainability
2016	-0.2376	0.8571	-0.9047	-0.6876	-2.2118	Low or weak financial sustainability
2017	-0.60432	0.8218	-1.9453	-1.9082	-4.071	Low or weak financial sustainability
2018	-0.53098	0.7161	-1.0939	-0.8686	-2.1476	Low or weak financial sustainability
2019	-0.4943	0.2225	-0.337	-0.1447	-0.2099	Low or weak financial sustainability
2020	0.948115	-1.5049	-0.4316	-0.8812	-0.756	Low or weak financial sustainability
2021	1.204816	-0.7646	-0.4316	-0.7045	-1.5763	Low or weak financial sustainability
2022	1.045906	-0.5178	-0.1478	-0.4898	-1.1657	Low or weak financial sustainability
2023	1.168145	-0.5883	0.7982	0.5582	0.7766	Moderate financial sustainability
2024	1.889354	-1.5401	1.0821	0.474	1.2068	Moderate financial sustainability

Note: Index calculated based on standardized Z-scores of four fiscal indicators. Higher values reflect stronger sustainability. **Table X. Financial Sustainability Index (FSI) and Annual Interpretation – Romania (2009–2024)**

Source: Own computation based on Eurostat data.

Figure 1 illustrates the trajectory of Romania's Financial Sustainability Index (FSI) between 2009 and 2024. The index captures the combined fiscal performance based on debt, deficit, public investment, and capital

expenditure. The graph shows a pronounced decline in FSI during the 2013–2018 period, reflecting weakening fiscal sustainability. A modest recovery starts in 2019.

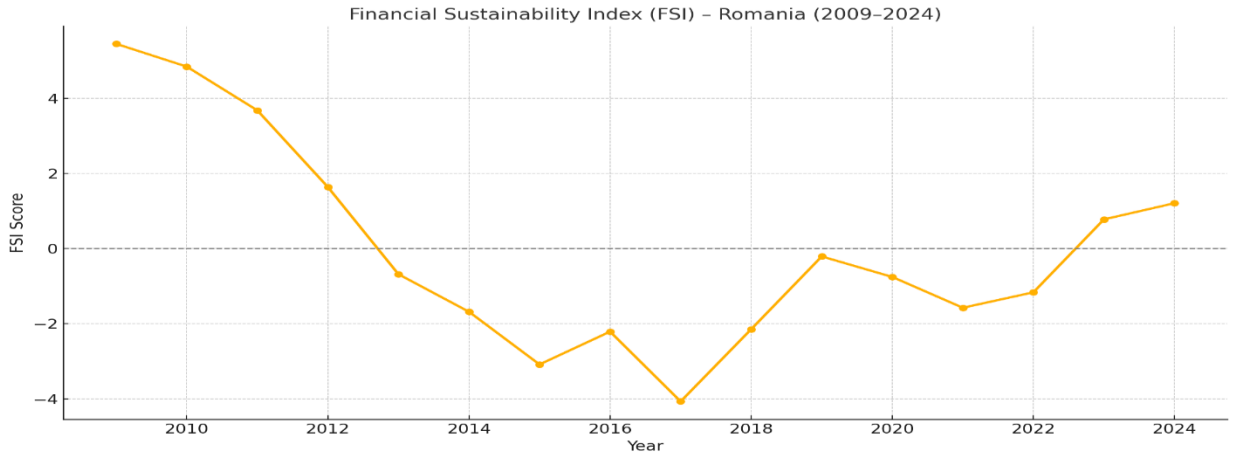

Figure 1. Evolution of the Financial Sustainability Index (FSI) in Romania, 2009–2024
Source: Author's visualization based on standardized index calculations

The results highlight periods of fiscal strength and weakness, with the lowest sustainability recorded in 2017 and gradual improvement observed from 2020 onward. The consistency between the table and the graph confirms the FSI's reliability in capturing macro-fiscal dynamics.

1. Key Findings

The Financial Sustainability Index (FSI) constructed for Romania for the period 2009–2024 reveals drastic fluctuations in the Romanian fiscal situation:

• High FSI values (2010, 2024): indicate periods of relative fiscal strength, underpinned by a sound balance of public spending and controlled deficits.
• Towards lower FSI scores (2017, 2018): signal a decrease in fiscal sustainability, due to diluted capital expenditures and recurring structural deficits, despite moderate levels of debt.
•Post-2020 Recovery: There is a noticeable upward trend observed in the index after the pandemic, with fiscal consolidation and increased capital investment gaining ground.

The years 2013–2018 are a period of concern, marked by underinvestment and reduced development expenditure, as the macroeconomic environment was overall stable. This is reflective of a shift away from the sustainable management of finances during this period.

2. Economic Implications

The FSI proves to be an effective tool for assessing fiscal behavior beyond traditional debt-deficit analysis. Its results show that:

•Sustainability not only implies balancing the budget but also that the public resources are being invested in long-term growth.
• Investment and capital expenditures are at the heart of strengthening fiscal buffers, especially during periods of foreign shocks.

In years in which FSI declined, fiscal vulnerabilities increased (e.g., dependence on consumption, investment in soft infrastructure), while higher values of FSI were associated with more strategic and prospective fiscal policy.

FSI fluctuations mirror the policy choices which bear lasting economic effects, particularly in infrastructure, investment efficiency, and government performance.

Conclusions, Originality and Limitations

1. Conclusions

The present study built a Financial Sustainability Index (FSI) dedicated to Romania, 2009-2024, by using the aggregation of four significant indicators: public debt, budget deficit, public investment, and capital expenditure ratio. The FSI, by normalized Z-scores, provided a dynamic and profound assessment of Romania's fiscal sustainability trajectory.

The results reveal clear phases of fiscal performance:

• 2009–2012: strong sustainability with high levels of public investment
• 2013–2018: steep fall, driven by reduced capital expenditures and long-term structural deficits
• 2019–2024: recovery takes hold, with 2024 the best FSI performance due to improved investment ratios and deficits under control

The FSI highlights the importance of not only maintaining a balanced budget, but also ensuring that public resources are strategically allocated to long-term growth objectives.

2. Originality and Academic Contribution

This research makes several original contributions to the literature on fiscal sustainability:

- **Novel country-specific index**: Unlike many macro-fiscal indices applied in cross-country settings (IMF, 2011; OECD, 2022), this study focuses exclusively on Romania, allowing for greater contextual depth.
- **Integration of both quantitative and qualitative fiscal dimensions**: By incorporating both traditional debt/deficit metrics and structural investment indicators, the index offers a more balanced and policy-relevant view of sustainability (Barrios & Schaechter, 2009; Dziemianowicz et al., 2021).
- **Transparent methodology based on standardization**: The full Z-score structure allows for replication or adaptation to other countries or regions.
- **Longitudinal perspective**: Covering 16 years of data, the index offers insights into both pre-crisis, crisis, and post-crisis fiscal governance trends.

3. Limitations and Further Research

Despite its contributions, this study has several limitations:

- The index is **based on only four variables**, and although theoretically relevant, it omits other factors such as fiscal rule compliance, tax base structure, and contingent liabilities (IMF, 2014).
- The **use of annual data** limits the ability to capture intra-annual shocks or short-term policy shifts. Incorporating **quarterly data** or using a **panel of similar economies** could enhance the robustness of the results.
- **The 2024 data point is a forecast**, not an observed value. Future updates should replace this with actual fiscal outcomes once available.
- The model **does not include institutional or governance variables**, which are often linked to fiscal credibility and long-term sustainability (OECD, 2008; European Commission, 2021).

Future research could expand the index to include institutional quality indicators, test its correlation with growth and inflation, or compare Romania's FSI evolution with other Central and Eastern European countries.

References

1. *Barrios, S. and Schaechter, A., 2009.* The quality of public finances and economic growth. *European Economy, Occasional Papers 56.*
2. *Blanchard, O., Chouraqui, J.C., Hagemann, R. and Sartor, N., 1990.* The sustainability of fiscal policy: New answers to an old question. *OECD Economic Studies, No. 15.*
3. *Bohn, H., 1998.* The behavior of U.S. public debt and deficits. *Quarterly Journal of Economics, 113(3), pp.949–963.*
4. *Dziemianowicz, W., Malik, K. and Szlachta, J., 2021.* Public investment and sustainable development: European perspectives. *Sustainability, 13(1), pp.1–19.*
5. *European Commission, 2021.* Fiscal Sustainability Report 2021. *Brussels: Directorate-General for Economic and Financial Affairs.*
6. *European Commission, 2023.* Reforming EU economic governance. *[online] Available at: https://ec.europa.eu [Accessed 23 Apr. 2025].*
7. *Eurostat, 2024.* Government finance statistics. *[online] Available at: https://ec.europa.eu/eurostat [Accessed 23 Apr. 2025].*
8. *Eurostat, 2024.* General government gross debt – annual data (teina225). *[online] Available at: https://ec.europa.eu/eurostat [Accessed 23 Apr. 2025].*
9. *Eurostat, 2024.* General government deficit/surplus – annual data (tec00127). *[online] Available at: https://ec.europa.eu/eurostat [Accessed 23 Apr. 2025].*
10. *Eurostat, 2024.* General government gross fixed capital formation (GFCF) – annual data (teina210). *[online] Available at: https://ec.europa.eu/eurostat [Accessed 23 Apr. 2025].*
11. *Eurostat, 2024.* Total general government expenditure (% of GDP) – annual data (tec00023). *[online] Available at: https://ec.europa.eu/eurostat [Accessed 23 Apr. 2025].*
12. *IMF, 2011.* Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis. *Washington, DC: International Monetary Fund.*
13. *IMF, 2014.* Public Investment Management Assessment (PIMA). *Washington, DC: International Monetary Fund.*
14. *OECD, 2008.* Handbook on Constructing Composite Indicators: Methodology and User Guide. *Paris: OECD Publishing.*
15. *OECD, 2022.* Sovereign borrowing outlook for OECD countries. *Paris: OECD Publishing.*
16. *World Bank, 2022.* Public Sector Performance Indicators and Debt Transparency. *Washington, DC: The World Bank.*