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Determinants of the Public debt in the European Union Countries and its sustainability amid the Economic Crisis

SUMMARY

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CONTENTS OF THE DOCTORAL THESIS

THE TOPIC OF THE DOCTORAL THESIS AND ITS FIELD

Public debt is a major concern for governments worldwide, particularly in European Union (EU) countries, which heavily rely on fiscal policies to address economic crises. Public debt serves as a crucial tool for financing public investments and promoting economic growth. However, when it exceeds sustainable limits, it can have negative macroeconomic effects, reducing countries' ability to manage economic crises and ensure long-term fiscal sustainability.

In this context, this dissertation aims to examine the determinants of public debt and its sustainability in EU countries, focusing on the impact of various economic crises. The study explores the nonlinear relationship between public debt and economic growth, identifying the thresholds at which the effect of debt shifts from positive to negative. It also evaluates the factors influencing public debt sustainability and the effects of recent economic events on fiscal balance, while providing policy recommendations to enhance fiscal sustainability and improve public debt management to support sustainable economic growth in the EU.

This dissertation addresses the economic challenges faced by EU governments amid recurring economic crises, analyzing economic disparities among member states, particularly the differences in fiscal policies between high-income and low-income countries. It highlights the effects of rising public debt on long-term economic growth, the challenges posed by imbalances between public debt management and fiscal policies, and the impact of global economic and political crises on fiscal sustainability.

This thesis offers a novel contribution by comprehensively analyzing the determinants of public debt sustainability in European Union (EU) countries, particularly in the context of successive economic crises. Unlike previous studies, which often focus on either linear relationships or single economic events, this research employs advanced econometric models—including the Generalized Method of Moments (GMM), Panel Autoregressive Distributed Lag (ARDL), Threshold Regression Analysis, and the Finite Mixture Model (FMM)—to examine the complex and nonlinear interactions between public debt, economic growth, and fiscal sustainability. Moreover, this study uniquely compares the EU with G20 nations, identifying critical debt-to-GDP thresholds that differentiate sustainable from unsustainable debt levels. It also distinguishes between high-debt and low-debt countries and between old and new EU member states, offering a granular perspective on public debt sustainability across different economic contexts. By incorporating macroeconomic factors such as military expenditure, healthcare spending, and private debt, this thesis provides a more comprehensive understanding of the factors influencing fiscal sustainability, filling a significant gap in the existing literature.

Furthermore, the dissertation examines fiscal sustainability in the EU in light of ongoing crises, such as the COVID-19 pandemic and the Russia-Ukraine conflict, by analyzing the relationship between public revenues and expenditures, borrowing, and public debt. The study recommends adopting balanced fiscal policies that maintain public debt sustainability, enhance the efficiency of government spending, and allocate resources toward education, infrastructure, and innovation. Additionally, it emphasizes strengthening the competitiveness of domestic industries and diversifying exports.

The motivation for this research stems from the increasing concerns over rising public debt in EU countries, particularly in light of recent economic shocks such as the 2008 global financial crisis, the COVID-19 pandemic, and the ongoing conflict in Ukraine. These crises have exacerbated fiscal vulnerabilities, making it imperative to reassess the sustainability of public debt and develop more effective fiscal policies. The importance of this thesis lies in its policy-oriented approach, as it not only identifies the determinants of public debt sustainability but also provides actionable recommendations for improving debt management. By classifying EU countries based on debt levels and fiscal structures, this research aims to support policymakers in designing targeted fiscal strategies that balance economic growth with financial stability. Furthermore, by addressing the gaps in current research, this thesis contributes valuable insights that can guide future economic policies, ensuring that EU countries can navigate economic crises while maintaining sustainable public finances.

DOCTORAL THESIS OBJECTIVES AND RESEARCH METHODOLOGY

The main goal of this thesis is to investigate what causes public debt in European Union countries and how long it can last in the face of several economic crises. It will also look into the connection between public debt, economic growth, and sustainable development. This thesis presents an analysis of the factors influencing the sustainability of public debt, emphasizing the distinctions between old and new EU member states, as well as high- and low-debt countries. It also examines the non-linear effects of public debt on economic growth in the context of the European Union and G20 nations. It also aims to analyze the fiscal sustainability in European Union countries, especially during the Covid-19 pandemic and Ukraine conflict and to classify countries based on the level of debt, the alignment of revenues and public expenditures using advanced quantitative models, and to offer policy recommendations to improve the sustainability of public finances and improve public debt management in a way that supports sustainable economic growth.

Table I.1. Type of research conducted, methodologies applied, and objectives pursued

No.	Research Type	Methodology	Objectives	Chapter	Sample
1	Quantitative	• Bibliometric Analysis	O.1. Analysis of the development of research on the sustainability of public debt in European Union countries. O.2. Bibliometric analysis of research on the relationship between public debt sustainability, economic growth, and financial	1	1352 publications indexed in the Web of Science database on the topic of sustainability of public debt, between 1987 and 2024.

			policies in European Union countries.		
2	Quantitative	• Ggeneralized Method of Moments • panel Autoregressive Distributed Lag	O.3. Explore the relationship between public debt and sustainable economic development in all EU countries. O.4. Analyze the impact of public debt on sustainable economic development, specifically by classifying EU countries into two groups based on the debt-to-GDP ratio according to the Maastricht Treaty standards (over 60% as high-debt countries and under 60% as low-debt countries) to provide a more detailed and effective report.	2	EU Member States, Divided into 3 samples: total sample (n=27 states), High-debt countries sample (n = 13 states) and Low-debt country sample (n=14 states); 2000-2022 period
3	Quantitative	• Tthreshold Regression	O.5. Analysis of the non-linear relationship between public debt and economic growth, focusing on EU countries and G20 countries.	3	EU member state (n=27 states) and G20 member state (n=16 states) 2000-2023 period

			O.6. Understanding how the impact of public debt on economic growth changes at different levels of debt and identifying the thresholds at which the impact shifts from positive to negative. O.7. Providing policy recommendations to improve public debt management and enhance sustainable economic growth.		
4	Quantitative	• Generalized Method of Moments	O. 8 Investigating the determinants of public debt sustainability for European Union countries, with a focus on the impact of macroeconomic variables such as military spending, health spending, private debt, and political stability. O.9. Providing recommendations to enhance debt sustainability considering	4	EU member state (n=27 states) 2000-2022

			increasing economic challenges.		
5	Quantitative	• Panel unit roots • Cointegration tests • fully modified ordinary least squares (FMOLS) • the mixture model	O.10. Studying the sustainability of public finances in the European Union structure O.11. Analyze the extent to which recent events have affected the financial balance	5	EU Member States, Divided into 3 samples: total sample (n=27 states), OMS sample (n = 14 states) and NMS sample (n=13 states); 1995-2024 period

To accomplish these research objectives, as outlined in Table I.1, the study employs a comprehensive approach that encompasses a thorough literature review and evaluation and empirical and methodological strategies, integrating various contemporary data analysis techniques. This doctoral thesis's findings, which meet its stated goals and aims, are based on a careful study of the literature. More than 500 scientific papers about public finance were carefully read and analyzed for this study. The work includes a comprehensive presentation and discussion of 37 tables and 14 figures, with a summary provided at the beginning of the thesis.

STRUCTURE OF THE DOCTORAL THESIS

Five main chapters structure the doctoral thesis. The initial chapter focuses on the introduction and comprehensive examination of the thesis topic concerning the sustainability of public debt in EU countries. We allocate subsequent chapters to empirical research, each focusing on a distinct area. The second chapter analyzes the impact of public debt on sustainable economic development in the European Union, both pre-and post-coronavirus. It classifies EU countries into two groups based on the debt-to-GDP ratio according to Maastricht Treaty standards: high-debt countries (more than 60%) and low-debt countries (less than 60%). This classification facilitates a detailed and comprehensive analysis utilizing the GMM and panel ARDL methodologies. Chapter Three sheds light on the analysis of the non-linear relationship between public debt and economic growth, focusing on EU countries and G20 countries, and understanding how the impact of public debt on economic growth changes at different levels of debt. The analysis determines the thresholds at which the impact transitions from positive to negative by employing panel threshold regression methodology. Chapter four analyzes the factors influencing the sustainability of public debt in EU countries during the economic crisis, employing the GMM methodology. Chapter Five looks at fiscal sustainability by looking at how public revenues and expenditures are linked, how they change over time, and what causes what. It also looks at net primary lending and gross public debt, focusing on how crises in European economies have changed these numbers.

The first chapter, "*Sustainability of Public Debt in European Union Countries*," introduces the concept of public debt and presents relevant statistics about the central theme of this paper. The initial chapter provides a systematic definition of financial sustainability, detailing its concept, dimensions, and influencing factors. The second part of the chapter emphasized public debt, detailing its unique concepts and classifications. The third section examines debt sustainability in detail. The last part of the paper is a bibliometric analysis of public debt sustainability. It addresses the original research goals, which were to look at how research on public debt sustainability has changed over time in EU countries and to find and evaluate the quality of the literature listed in WOS. We conclude the first chapter with a section that focuses on conclusions and personal opinions.

The second chapter examines the connection between public debt and sustainable economic development. Beginning with the second chapter, titled "*The Effect of Public Debt on Sustainable Economic Development in the European Union Pre- and Post-COVID-19*," it adheres to a structured academic format. It offers a clear presentation of the thesis, encompassing an introduction to the topic, a literature review, a description of the data and methodology employed, a statement of results, and a discussion that aligns with existing literature. A conclusion section supplements the chapters, encompassing the primary ideas, limitations, and recommendations and outlining future research directions. It looks at how public debt affects long-term economic growth by dividing EU countries into two groups based on their debt-to-GDP ratio, as set by the Maastricht Treaty: high-debt countries (over 60%) and low-debt countries (under 60%). This classification aims to enhance the report's detail and effectiveness. This includes looking at things like government spending on education, healthcare costs, the number of people working, research and development expenditures, and the amount of money the government spends on jobs to see how they affect long-term economic growth while taking into account the problems caused by the COVID-19 pandemic. The research uses standard economic analyses. We use the GMM method for all 27 EU countries. We apply the panel ARDL method in both high and low-debt countries. Additionally, the FMOLS method has been incorporated to further analyze the relationship, providing valuable insights into how public debt impacts growth in both high-debt and low-debt EU countries, reinforcing the robustness of the findings.

The third chapter analyzes the *"U-shaped relationship between public debt and economic growth in the European Union and G20 countries*." This chapter offers a thorough review of the literature concerning as well as the theories associated with the impact of public debt on economic growth. This study seeks to analyze the relationship across varying debt levels to identify the thresholds at which the impact transitions from positive to negative. The panel threshold regression method is used in this study to look into these relationships. This helps policymakers make suggestions for better managing public debt and promoting long-term economic growth.

In chapter four, *"Investigating the Determinants of Public Debt Sustainability for European Union Countries during Economic Crises*," the authors look at the things that affect the long-term viability of public debt, focusing on the part that large-scale economic factors like military spending, health spending, and private debt play. This chapter examines the existing gap in the literature concerning the influence of these variables on debt sustainability amid rising economic challenges. The Generalized Method of Moments (GMM) is used in this chapter to look at a group of EU countries over more than 20 years and test ideas about how important factors affect the long-term viability of public debt.

"*Fiscal Sustainability in European Union Countries Amid Current Crises: The COVID-19 Pandemic and the Ukraine War* " is the title of the fifth chapter. The chapters conform to established academic standards, enhancing the clarity of the thesis. This paper has an introduction to the subject, a review of the literature, a description of the data and methods used, a presentation of the results, a discussion that fits with the existing literature, and finally a section that sums up the main points, any problems, suggestions, and specific directions for future research. This chapter aims to evaluate the fiscal sustainability of a sample from the European Union during the period from 1995 to 2024. The analysis of the available data will achieve this objective. The goal of this study is to identify how false dependencies can be enhanced, check the stability of variables, and look into cointegration at the group or panel level. We also conduct multiple long-term panel regressions to evaluate the relationship between revenues, expenditures, net primary lending, and gross public debt. The methodological framework employing the finite mix model (FMM) strengthens these regressions.

RESULTS OF THE DOCTORAL THESIS

CHAPTER 1: The Sustainability of Public Debt in European Union Countries

In light of the increasing importance of public debt sustainability for European Union countries, this chapter presents an in-depth analysis of the theoretical and empirical dimensions of public debt, with particular emphasis on its long-term sustainability. The chapter aims to review the current literature, examine the evolution of the concept of public debt sustainability, and explore the interconnections with economic growth and financial policies, all through the lens of the most recent research trends.

Given that public debt has emerged as a significant issue in the economic landscape, particularly after the global financial crises, it is crucial to establish a solid theoretical framework for understanding the concept of debt sustainability. This framework will help assess the capacity of EU countries to manage their debt and ensure financial stability. The chapter provides a thorough examination of the most pertinent theories and methodologies applied to the study of public debt sustainability, highlighting the main assumptions and challenges that arise in this field of study.

The theoretical foundations of public debt sustainability have evolved considerably over the past few decades, with an increasing focus on the interaction between fiscal policies, government expenditure, and economic growth. Researchers have made important strides in linking debt sustainability to fiscal performance, examining how government policies impact the debt-to-GDP ratio and the broader economic environment. Recent studies emphasize the growing importance of fiscal space and institutional factors, such as governance and debt management, in shaping the future of public debt sustainability.

This chapter also investigates the contributions of major scholars to the field of public debt sustainability, drawing attention to the gaps and emerging issues that have yet to be fully explored. To facilitate a deeper understanding of the literature, bibliometric analysis has been conducted using the VOSviewer software (Van Eck and Waltman, 2010) and the Web of Science database, focusing on publications related to public debt sustainability in the EU context. The analysis reveals significant trends in the academic discourse, showing a growing interest in the subject, especially after the global financial crisis of 2008.

To achieve the objectives of the thesis—namely, to assess the evolution of research on public debt sustainability in EU countries (objective O.1) and to analyze the relationship between public debt sustainability, economic growth, and financial policies (objective O.2)—the chapter is organized as follows: It begins with a historical overview of financial sustainability, defining its concept, dimensions, and the factors affecting it. The following sections address public debt, including its definition, classification, and management. The next section focuses on the sustainability of public debt, providing a definition and a deeper examination of the concept. The chapter then explores the state of public debt in EU countries during the economic crisis. The chapter concludes with a bibliometric analysis that highlights the increasing academic interest in public debt sustainability, providing a clear picture of the current state of research and pointing to potential directions for future studies.

CHAPTER 2: The effect of Public Debt on sustainable economic development in the European Union Pre and Post COVID-19

This study examines the relationship between public debt and sustainable economic development across all EU countries (Objective O.3 of the thesis). Additionally, it aims to assess the impact of public debt on sustainable economic development by categorizing EU nations into two groups according to the Maastricht Treaty criteria: high-debt countries (with a debt-to-GDP ratio exceeding 60%) and low-debt countries (with a ratio below 60%). This classification aims to deliver a more comprehensive and actionable analysis (Objective O.4 of the thesis), especially in light of ongoing challenges like the COVID-19 pandemic.

The study showed a weak negative relationship between public debt and long-term economic growth across all European Union countries, whether in high-debt or low-debt nations. The results from the GMM model reflect this trend, highlighting the financial burden imposed by high debt levels on national economies. These results align with previous studies such as Melkamu (2021), Van (2020), and Lartey et al. (2018), which found that high levels of public debt negatively affect economic growth. High debt slows down growth by limiting investment opportunities and constraining financial flexibility. In high-debt countries, the ARDL model indicated that debt may support GDP growth in the long term by financing investment projects and infrastructure. However, these benefits are limited by the costs of debt servicing, which negatively affect the economy. On the other hand, in low-debt countries, public debt appears to have a more significant negative impact on growth, suggesting that debt accumulation may hinder development in these countries if not managed effectively.

As for other economic variables, the study showed that international trade has a positive impact on economic growth across all models used, confirming that engaging in international trade fosters economic expansion. These results align with studies by Kim et al. (2017) and Lartey et al. (2018), which demonstrated that international trade plays a crucial role in promoting economic growth. The impact of inflation on growth was more complex, as moderate inflation might stimulate demand and growth, while high inflation reduces purchasing power and destabilizes the economy. Regarding life expectancy, some models observed a negative impact on economic growth, attributed to increased healthcare and social service costs. In this regard, Ojukwu (2021) supported these findings, noting that an increase in life expectancy could have negative economic effects if resources are not effectively allocated in the health sector.

For high-debt countries, the ARDL results suggested that debt may positively influence GDP in the long run, offering opportunities for financing investment projects. However, these benefits are counterbalanced by the negative effects of debt servicing costs. In contrast, for low-debt countries, the study showed a more pronounced negative relationship between debt and growth, indicating that debt accumulation in these countries can hinder economic development. The study also highlighted that expanding the labor force and investing in health, education, and research and development may have negative effects, suggesting challenges in efficient resource allocation.

The study also showed that health, research and development, and education expenditure negatively impact economic growth in most models, which could indicate inefficiencies in public spending in these areas or structural challenges that prevent these investments from translating into tangible economic benefits. In high-debt countries, some nations may struggle to fully capitalize on these investments due to fiscal constraints caused by public debt.

The results align with previous studies that show public debt negatively impacts growth in high-debt countries, while it may have a more significant negative effect in low-debt countries. The findings also support studies like Ndoricimpa (2020), which demonstrated that trade positively affects GDP growth. Additionally, Saungwere and Odhiambo (2019) found that debt positively impacts GDP in both the short and long term, even though their study focused on the long-term negative effects of debt on growth. Moreover, the results are consistent with the findings of Spilioti and Vamvoukas (2015), which indicated that trade and unemployment significantly affect GDP.

CHAPTER 3: U-shaped relationship between public debt and Economic growth in European Union countries and G20 countries

The main objective of this study is to analyze the U- shaped between government debt and economic growth, focusing on EU and G20 countries (Objective O.5 in the thesis), and aims to understand how the impact of government debt on economic growth changes at different levels of debt and identifying the thresholds at which the impact shifts from positive to negative (Objective O.6 in the thesis), as well as providing policy recommendations to improve public debt.

For the European Union (EU), the study identifies a clear threshold at a debt-to-GDP ratio of 60.8%. Below this level, public debt has a positive effect on economic growth, suggesting that moderate debt levels may be conducive to investment and economic expansion. However, surpassing this threshold leads to a negative impact on growth, as higher debt levels may begin to crowd out private investment and reduce fiscal space for productive spending. Furthermore, the study found that government expenditure negatively affects growth, likely due to its crowding-out effect on private-sector investment. Similarly, foreign direct investment (FDI) and the current account balance (CAB) both show a slight negative impact on growth, indicating that external factors may not offset the negative effects of excessive public debt. These results align with the findings of studies by Pattillo et al. (2011), which emphasize the detrimental effects of high debt levels on growth.

In the case of the G20 countries, the study reveals a similar threshold effect, with the debt-to-GDP ratio having a positive impact on growth when it is below 62.13%. Once this threshold is exceeded, the effect of debt on growth becomes negative, suggesting that countries within the G20 also face limits beyond which public debt hinders economic performance. Interestingly, the impact of external factors such as FDI and the current account balance is more positive in the G20, suggesting that these countries may be better positioned to mitigate the negative effects of high debt through external investments and trade balances.

The study's results are consistent with several previous studies. For example, Pattillo et al. (2002) identified debt thresholds ranging from 35% to 40% of GDP for developing countries, with higher debt levels leading to negative outcomes for growth. Similarly, Checherita et al.

(2011) found that debt becomes detrimental when it exceeds 85% of GDP, aligning with the findings of this study. The threshold of 60.8% for EU countries and 62.13% for G20 countries suggests that public debt can have a positive impact on growth up to a point, but excessive debt can result in diminishing returns, in line with the inverted U-shape relationship described by Reinhart and Rogoff (2010).

The study also builds on previous research by exploring the specific thresholds for EU and G20 regions, which were not sufficiently addressed in earlier studies. While research by Mencinger et al. (2015) suggests that developed countries face adverse growth effects when debt surpasses 90-94%, and developing countries encounter a threshold around 44-45%, this study provides more nuanced insights for the EU and G20, indicating that these regions have slightly higher thresholds for optimal debt levels. Studies like Swamy (2015) also show how the debt-growth relationship can differ across countries, with thresholds varying from 84% to 114% of GDP, depending on economic and political factors.

Moreover, several studies, such as those by Deshpande (1997) and Siddique et al. (2016), demonstrate the inverse relationship between external debt and economic growth, emphasizing the crowding-out effect of debt on investment. This study's findings confirm that high levels of debt obstruct investment and repayment capacities, hindering growth. However, contrasting studies by Jayaraman and Lau (2009) and Fincke and Greiner (2015) suggest that external debt may foster growth when used for income-generating projects, further highlighting the need to distinguish between types of debt and their uses.

In addition to these theoretical and empirical contributions, the study's findings underscore the need for careful debt management policies. The varying economic contexts of EU and G20 countries imply that there is no one-size-fits-all approach. In EU countries, countries with high debt may face political resistance to implementing austerity measures or debt reduction strategies, which could lead to social unrest and economic slowdown. Similarly, G20 countries may face challenges in channeling debt into productive investments due to varying institutional frameworks and political contexts.

CHAPTER 4: Investigating the determinants of public debt sustainability for European Union countries

This research substantially improves the existing comprehension of public debt sustainability in EU countries by addressing a crucial gap in the prior literature. Previous study has examined many aspects of public debt; however, it has not thoroughly assessed the combined impact of the COVID-19 pandemic and the Ukraine crisis. This study includes new variables, including military spending, healthcare expenditures, private debt, and political stability, enhancing the examination of factors influencing the sustainability of governmental debt. The objective of the research Examining the factors influencing public debt sustainability in European Union nations, emphasizing the effects of macroeconomic variables including military expenditure, healthcare expenditure, private debt, and political stability (Objective O.8 in the thesis), while offering recommendations to improve debt sustainability amid escalating economic challenges (Objective O.9 in the thesis).

One of the key observations is the significant impact of previous debt (L.DEBT) on current public debt levels, affirming the continuity of high debt levels from earlier periods. This finding aligns with the research by Naveed and Islam (2024), who highlight the persistence of elevated debt in EU economies, indicating that past fiscal policies and debt accumulation trends continue to shape current debt dynamics.

Further, the study corroborates the work of Belguith and Omrane (2017), demonstrating that inflation and investment play crucial roles in influencing public debt. The increasing inflationary pressures, coupled with volatile investment environments, contribute to variations in public debt. These findings reflect the broader challenges faced by EU countries in managing debt levels amid economic instability. As inflation rises, it often necessitates greater government borrowing to meet fiscal needs, exacerbating the debt burden.

Government spending, as a critical factor influencing public debt, is emphasized in the current findings, particularly in relation to the need for fiscal policies that can support economic recovery. This is in line with the findings of Musah (2023), who stresses that government expenditure is instrumental in shaping debt trajectories, particularly during times of crisis. The results also echo the work of Manalo et al. (2022), which observed a negative correlation between foreign direct investment (FDI) and public debt, a pattern that is relevant in the context of global instability and ongoing efforts to attract investments.

The divergence of the present study's findings from those of Kijambu et al. (2023) regarding the impact of GDP growth on debt highlights the complexity of economic recovery in the post-pandemic era. While GDP growth is generally seen as a mitigating factor for debt, the study suggests that in the current climate of uncertainty, the relationship between GDP growth and public debt is not straightforward and requires a nuanced approach to policy formulation. Toth et al. (2022) further illustrate this by emphasizing the need for flexible policy frameworks capable of adapting to shifting economic conditions, including fluctuations in inflation and GDP growth.

In line with Ngasamiaku and Ngong'ho (2022), the study highlights the intricate dynamics of debt accumulation, with macroeconomic factors such as inflation, GDP growth, and investment playing intertwined roles in shaping debt sustainability. Their research offers significant recommendations for policymakers aiming to balance fiscal stability with the need for public investment, especially in times of uncertainty. This is particularly relevant in the context of the post-pandemic recovery, where managing public debt without stifling growth is a delicate challenge.

Pirtea et al. (2013) observed that debt-to-GDP ratios have proven resilient to economic shocks, such as the global financial crisis of 2007. Similarly, Dawood et al. (2021) emphasized the importance of economic growth and investment in mitigating the negative effects of external debt. These findings align with the present study, which underscores the importance of fostering economic growth through strategic investments to alleviate the pressure of rising public debt.

The study introduces several novel variables that have not been extensively analyzed in previous research. Notably, military expenditures (ME) were found to have a significant influence on public debt, particularly in the context of the Ukraine conflict. This finding points to the growing need for research into the broader implications of defense spending on public finances, especially in times of geopolitical crises. Additionally, health expenditures (HE), which surged during the COVID-19 pandemic, also play a crucial role in the escalation of public debt. The current study highlights the need for further research into how increased public spending in these areas affects long-term debt sustainability.

Another significant finding is the positive impact of private debt on public debt. The study suggests that private-sector borrowing, particularly during financial crises, can exert pressure on public finances. This insight calls for a more integrated approach to understanding the interactions between private and public debt, as private sector vulnerabilities can translate into fiscal challenges for governments.

Political stability (PS) was identified as another crucial determinant of public debt. The study demonstrates that a decline in political stability, such as during times of crisis or political upheaval, can worsen financial imbalances, resulting in higher public debt levels. This is particularly evident during the Eurozone debt crisis and the ongoing Ukraine conflict, where political instability has exacerbated fiscal pressures in affected countries.

CHAPTER 5. Fiscal Sustainability in European Union Countries Amid Current Crises: The COVID-19 Pandemic and the Ukraine War

The primary aim of this study is to examine the sustainability of public finances within the framework of the European Union (Objective O.10 in the dissertation). It also seeks to evaluate the degree to which recent events have influenced the financial equilibrium (Objective O.11 in the dissertation).

For instance, Bohn (2005) asserts that fiscal sustainability is achieved when the primary balance adjusts to changes in public debt, a concept that is mirrored in this study’s results. These findings suggest a long-term relationship between government revenues, expenditures, and lending, indicating that fiscal policy can adapt and sustain itself even amidst economic crises like the COVID-19 pandemic and the Ukraine-Russia conflict.

Moreover, Honohan (2007) points out that unsustainable public debt can lead to instability in government bond markets and banking systems, a view supported by this study’s observation of the interdependence between revenues and expenditures. This underscores the potential risks associated with fiscal imbalances and emphasizes the need for fiscal policies that can navigate these challenges. The results further align with Afonso and Rault’s (2010) cointegration analysis, which identifies disparities among EU countries, particularly between the older and newer member states. The study observes that while the interplay between revenues and expenditures is more pronounced in older member states, debt, and lending play a crucial role in newer ones, reinforcing the idea that fiscal sustainability is experienced differently across the EU.

Additionally, Reinhart and Rogoff (2008) emphasized the importance of the structure of debt, aligning with this study’s findings on the mutual influence between public debt and lending in newer EU member states. This highlights the critical role of debt management in ensuring fiscal sustainability. Similarly, Bravo and Silvestre (2002) analyzed budgetary sustainability in European countries, supporting the notion that fiscal sustainability, while varying across countries, is a common goal for most EU nations.

The empirical study by Ghosh et al. (2013) also concurs with this study’s results, indicating that while fiscal sustainability is generally maintained in the long term across most EU countries, challenges remain for newer members. This is reflected in the study's finding that the relationship between revenues and expenditures is stronger in older member states, while debt and lending emerge as key issues in newer member states. This distinction highlights the differing financial pressures faced by countries with different economic histories and contexts. Magazzino et al. (2019) further explored the relationship between the primary deficit and public debt in G7 countries, finding a strong correlation, which this study also confirms, showing a long-term relationship between net lending/borrowing (a measure of fiscal deficit) and public debt in EU countries.

The Brady and Magazzino (2018) study, utilizing the Finite Mixture Model (FMM), grouped countries based on their fiscal sustainability. The study identified a group of 11 countries with unsustainable fiscal policies, where expenditures were growing faster than revenues, and another group of 9 countries, mainly Northern and Continental EU members, that achieved financial sustainability with stable debt-to-GDP ratios. This classification resonates with the findings of this study, which confirms variation in the alignment of revenues and expenditures across EU countries, reflecting the different economic contexts and their impact on fiscal sustainability.

CONCLUSIONS. PERSONAL CONTRIBUTIONS. FUTURE RESEARCH DIRECTIONS

Amidst current global challenges characterized by a succession of unforeseen and interrelated crises, including economic and financial instability, the COVID-19 pandemic, the persistent conflict in Ukraine, demographic transitions, climate change, and swift technological progress, the matter of public debt has emerged as a paramount concern for policymakers. These difficulties have shown the weaknesses and inefficiencies of public finance institutions at national, regional, and international tiers. This thesis underscores that governments must continually adjust to a shifting and unpredictable environment, guaranteeing budgetary sustainability while addressing the current demands of their economies. Public debt, a crucial component of public finance, signifies both a financial obligation and a mechanism for economic recovery and progress when managed adeptly. Excessive debt levels, if unchecked, can severely impede economic development and fiscal stability.

The thesis aimed to analyze the determinants of public debt in European Union countries and its sustainability during economic crises, focusing on the factors influencing public debt dynamics and their long-term implications for public finance sustainability. The empirical analyses demonstrate that the relationship between public debt and economic development is complex, necessitating innovative solutions and structural reforms to reconcile the financing of development needs with the maintenance of debt stability in a volatile economic landscape.

This thesis has been written based on the economic and social conditions that the EU nations have experienced, which have had a considerable effect on the management and sustainability of public debt. The significance of studying public debt as a crucial instrument for economic policies and its contribution to maintaining economic stability and sustainable growth is underscored by global economic crises.

This thesis examines the current research efforts that are focused on assessing the growth and sustainability of public debt. This is one of the most essential components of public finance, and it requires regular study and reform. The study's goal is to provide a better understanding of the factors that affect the sustainability of public debt in European Union countries. This is especially important because the interconnection between public debt and economic and social policies is significant, and the study will take into account the impact of successive economic crises. The study's goal is to help fill in the gaps in the current literature by investigating hypotheses that are connected to the factors that determine public debt and the elements that impact its sustainability. It also gives data and analyses that better knowledge of the difficulties facing EU member states, delivering insights and ideas that help strengthen fiscal policies and maintain the sustainability of public debt, therefore promoting economic stability and sustainable growth.

This study is to examine the basic and modern factors that are connected to the drivers of public debt and its sustainability in the context of European economies, as mentioned in the introduction of the thesis. The thesis aims to emphasize the significance of public debt sustainability by concentrating on essential ideas such as public debt, public debt sustainability, financial sustainability, and public debt management. It will also examine how public debt affects economic growth and sustainable development. The study's goal is to evaluate the factors that influence the sustainability of public debt using advanced quantitative models. It will focus on countries in the European Union to address the gaps in the literature related to the analysis of public debt determinants and their impact on economies in light of recurring global economic crises.

The doctoral thesis is divided into five distinct chapters, each of which is intended to address the specific research concerns and objectives that have been presented. The specific goals of the study, as well as the overall purpose of the thesis, have been achieved via the application of a variety of advanced econometric techniques and data analysis methods that have been customized for each economic and financial event that was analyzed. Each chapter provides a general overview of the main results, their importance, how they fit into the existing literature, suggested changes, and the limits that were identified in the research. In this last section, it is important to assess and summarize the main findings that were obtained from the research.

This study's main contribution is the multi-perspective approach it provides for examining the sustainability of public debt in EU member states. The study offers fresh insights into the sustainability of public finance and the factors that contribute to public debt by utilizing a complicated and novel technique for each section of the empirical investigation. It maintains a strong applied viewpoint throughout. Considering the effects of recent economic and geopolitical catastrophes like the COVID-19 epidemic and the conflict in Ukraine, the study aims to show how public debt works and how it relates to long-term economic improvement.

Chapter One provides a comprehensive examination of the literature concerning the sustainability of public debt in EU nations, emphasizing the unique aspects of this subject and the contributions to the study of public finance within this framework. This chapter examines the consequences of public debt sustainability in the context of global economic issues, analyzing words such as "financial sustainability," "debt management," and "public investment," which have supplanted previous notions owing to global economic crises. It examines alterations in fiscal policies and the effects of crises on academic research, emphasizing modifications in governmental aims and financial practices, as well as the imperative to enhance institutional elements like governance in public debt management. Furthermore, the chapter finishes with a preliminary quantitative assessment via a bibliometric analysis of research published in the Web of Science database, focusing on the subject of public debt sustainability. This investigation seeks to enhance the correlation between the notion of financial sustainability and worldwide trends in public debt management. Policymakers should prioritize the formulation of comprehensive financial policies that improve institutional governance and provide effective procedures for public debt management while also reinforcing international collaboration to tackle future difficulties.

Chapter two of this study analyzes the impact of public debt on sustainable economic development in European Union countries before and after the COVID-19 pandemic. A methodological approach was employed to analyze the impact of public debt in high-debt and low-debt EU countries across various periods, including the years preceding and following the pandemic. This study employed two primary models, GMM and ARDL, to evaluate the relationship between public debt and various economic variables, including the labor force, inflation, trade, health expenditures, research and development, and educational expenditures. The GMM model results indicate that public debt in high-debt countries exerts a weak negative influence on economic growth, whereas the labor force has a positive contribution. Inflation and life expectancy have a detrimental impact on growth. The ARDL model results suggest that debt may promote long-term growth through investment financing; however, debt servicing costs constrain these advantages. In countries with low debt levels, debt impedes growth, whereas the labor force and business practices are the primary drivers of growth stimulation.

Chapter three presents findings that elucidate the non-linear relationship between public debt and economic growth in the European Union (EU) and G20 countries from 2000 to 2023, employing threshold regression analysis. In the case of European Union (EU) countries, the relationship between debt and growth follows a nonlinear pattern. When the debt-to-GDP ratio is at or below 60.8%, the effect on economic growth is positive. However, once this threshold is exceeded, the effect turns negative, suggesting that higher debt levels may impede growth. Additionally, government expenditure harms growth, likely due to its crowding-out effect on private investment. The current account balance also contributes negatively to growth, while the effect of foreign direct investment (FDI) is slightly negative. These findings indicate that maintaining moderate levels of public debt is essential for supporting growth, as exceeding critical thresholds may lead to negative economic outcomes. For G20 countries, the relationship between debt and growth also exhibits a threshold effect. When the debt-to-GDP ratio is at or below 62.13%, debt has a positive effect on economic growth. However, once this threshold is surpassed, the effect of debt on growth becomes negative. Unlike in the EU, both foreign direct investment (FDI) and the current account balance (CAB) show a slight positive effect on growth, suggesting that external factors such as investments and trade balances may help mitigate the negative effects of high debt levels.

The fourth chapter of the thesis focused on enhancing the literature by analyzing the factors influencing public debt sustainability in European Union (EU) nations. The study employs empirical analysis to examine factors influencing public debt, contrasting current findings with prior research. The analysis underscores the enduring impact of lagged debt (L.DEBT) on current public debt, reflecting the long-term characteristics of debt accumulation. This study identifies the primary factors contributing to rising debt, such as economic downturns, increased unemployment (U), military expenditure (ME), private debt (PD), and the fiscal consequences of crises, including the COVID-19 pandemic. It highlights the significant impact of political stability and foreign direct investment on public debt dynamics. The findings emphasize the necessity of implementing comprehensive financial policies, such as counter-cyclical measures, efficient public spending, and fiscal reforms, to achieve long-term debt sustainability and enhance fiscal resilience in EU countries.

Chapter five, titled "Fiscal Sustainability in European Union Countries in the Context of Current Crises: The COVID-19 Pandemic and the War in Ukraine," offers a significant contribution to the field by examining the effects of consecutive economic crises on fiscal sustainability within EU nations. This study analyzed the relationships between government revenues and expenditures and the connection between borrowing and public debt, employing unit root tests, cointegration tests, and finite mixture model analysis. The findings indicated a significant interdependence among EU member states, both established and recent, highlighting the collective influence of fiscal policies and economic transformations at the EU level. The cointegration tests validated the long-term relationship between revenues and expenditures, as well as between borrowing and public debt, thereby supporting the hypothesis of attaining long-term financial sustainability, albeit with variations among countries. Causality tests indicated distinct patterns of influence between the two groups, with a more pronounced relationship between revenues and expenditures in older member states, whereas borrowing and debt were identified as significant factors in new member states. The finite mixture model (FMM) analysis categorized countries into three groups according to the relationship between revenues and expenditures, highlighting the distinct challenges faced by each category. This study's results support the proposed policy recommendations, emphasizing the necessity for enhanced financial coordination among EU nations to achieve a cohesive strategy for fiscal sustainability. The study advocates for the implementation of targeted policies that address the distinct financial circumstances of both established and emerging member states. Member states should prioritize the reform of public debt management, the enhancement of transparency, and the strengthening of oversight regarding government spending. Moreover, it is essential to transition from dependence on debt to more sustainable revenue streams. It is recommended that long-term fiscal strategies be developed to balance public spending and revenue generation, considering the challenges presented by crises. The study concludes by recommending targeted support for new member states in developing financial frameworks that align with the European model, thereby promoting enhanced financial integration throughout the Union.

It is very important to look into what causes public debt and how long it can last in EU countries that are currently going through crises. This study shows how important it is to know how outside events affect the financial security of EU countries, especially when it comes to the ability to pay back their public debt, by looking at financial trends from different economic and social points of view. The results show that fiscal solvency is getting more attention, especially since debt levels are going up after the crisis. The study also talks about the importance of fiscal policy, managing debt, and keeping the economy strong during tough times. This shows that government methods and fiscal goals have changed.

Policy Implications of the Studies

Based on the study's findings, it is recommended to adopt integrated financial policies that focus on improving public financial sustainability in European Union countries, taking into account the disparities between high-debt and low-debt countries. It is advisable to categorize the recommendations into specific areas to ensure effective implementation, focusing on the following key points:

1. **Public Financial Policies:** EU countries should enhance financial coordination to implement a cohesive strategy focused on public financial sustainability, with financial resources allocated to investment projects that support sustainable growth. Efforts should be made to improve transparency and strengthen oversight of government spending to ensure maximum benefit from financial resources.
2. **Public Debt Reduction Strategies:** It is recommended to manage public debt carefully, ensuring it does not exceed the set thresholds (60.8% for the EU and 62.13% for the G20 countries), with mechanisms in place to reduce excessive borrowing and enhance tax revenue collection. Additionally, the efficiency of spending should be improved, especially in key sectors such as education, health, and infrastructure, ensuring that spending is directed to support sustainable growth.
3. **High-Debt Countries:** For EU member states with high debt, it is recommended to reassess economic strategies to reduce the debt service burden while ensuring that debt increases are directed toward financing investment projects that contribute to growth. The government should also invest in human resources through improvements in education and training to increase productivity.
4. **Low-Debt Countries:** For low-debt countries, trade policies should be improved, and innovation should be fostered through investments in research and development. Policies that encourage foreign direct investment (FDI) should also be adopted by improving the investment environment and providing tax incentives, which will help stimulate economic growth.
5. **Measures During Economic Crises:** During times of economic crises, such as the COVID-19 pandemic or geopolitical tensions, government spending should be carefully monitored to prevent the accumulation of debt. Counter-cyclical measures, such as enhancing social safety nets and increasing tax revenues, should be implemented to mitigate the effects of economic downturns on public finances.
6. **Enhancing Political and Economic Stability:** It is essential to improve political stability to attract foreign investments and strengthen economic stability, which will help reduce the impact of global disruptions on public debt. Simultaneously, efforts should be made to strengthen public debt management and achieve a balance between expenditures and revenues through the development of long-term financial strategies.

Future Research

Despite the successful attainment of the primary objectives of this research, as affirmed in the conclusions section, and taking into account the analyses presented throughout this thesis, alongside an acknowledgment of the limitations inherent in the conducted research, which have been elaborated upon in each chapter, a series of recommendations can be proposed for future research avenues in the domain of public finance, emphasizing contemporary economic challenges such as economic and health crises. Future studies may concentrate on examining additional dimensions of the variables influencing the sustainability of public debt, including the effects of geopolitical changes and evolving fiscal policies on debt sustainability in EU nations. The research may be broadened to incorporate comparative studies between EU nations and other countries across various global regions to assess the impact of international economic crises on public debt. Future studies might be improved by concentrating on the use of novel economic models to examine the impact of public expenditure on essential sectors, such as health and education, during contemporary crises. Future research should focus on investigating the effects of alterations in monetary policies on the long-term sustainability of public debt while also analyzing the social and political issues that affect public debt management within the evolving global economy.

Also, the models and theories created here could be improved in future research by including more factors that aren't just related to politics and economics. To get a better understanding of how public debt changes over time, the study could look at things like changes in geopolitics, changes in fiscal policies, and new ideas in monetary policy. In the future, researchers might also look at how global economic problems affect the ability of governments to pay their debts by comparing not only EU countries but also different parts of the world. The role of public spending in important areas like healthcare, education, and defense during disasters is another topic that could be looked into. To make sure the results are still useful as the global economy changes, the tests could be done again using different economic models and new data to see how strong the theories are. In the end, studying these factors more will help lawmakers come up with creative short- and long-term financial plans for dealing with public debt more effectively.

Limitations of the studies

This thesis provides insights into the determinants of public debt and its sustainability; however, it is important to acknowledge the inherent limitations of the study. The research primarily utilizes empirical data from European Union countries, potentially failing to capture the diverse economic, political, and institutional contexts present in other regions. The analysis relies on historical data, which may not adequately represent the rapidly changing economic environment, especially considering significant global events. While sophisticated, the models employed in the study depend on particular assumptions and may not account for all variables influencing public debt dynamics, particularly future economic and geopolitical developments. Additional research is required to enhance the models and expand the analysis to include a broader array of data sources and supplementary factors that may more precisely represent the complexities of public debt sustainability.

List of published research

1. El-Naser, A. (2023). Public debt, institutional quality, and economic growth in EU countries in the aftermath of COVID-19 and war-induced crisis. *Journal of Smart Economic Growth*, 8(3). https://jseg.ro/index.php/jseg/article/view/245

2. Dincă, G., Netcu, I.-C., & El-Naser, A. (2024). Analyzing EU's Agricultural Sector and Public Spending under Climate Change. *Sustainability*, *16*(1), 72. https://doi.org/10.3390/su16010072

3. El-Naser, A., Dincă, G., & Dincă, M. (2024). Investigating the determinants of public debt sustainability for European Union countries. Scientific Annals of Economics and Business, 71.

4. El-Naser, A. (2024). The influence of the shadow economy and corruption on public debt in European Union countries pre and post-COVID-19. *Ovidius University Annals, Economic Sciences Series*, *0*(2), 175-185.

List of conference participants.

1. The 6th edition of the International Conference „**Inclusive and sustainable economic growth. Challenges, measures and solutions**” 26-27 May 2023, Transilvania University of Brasov, Romania.

El-Naser, A. (2023). Public debt, institutional quality, and economic growth in EU countries in the aftermath of COVID-19 and war-induced crisis.

2. The 7th Edition of the International Conference "**Inclusive and Sustainable Economic Growth. Challenges, Measures, and Solutions**. 11 October 2024, Transilvania University of Brasov.

El-Naser, A., Dincă, G., & Dincă, M. (2024). Investigating the determinants of public debt sustainability for European Union countries.

3. The 13th Edition of the International Conference "**GLOBAL ECONOMY UNDER CRISIS"** 11-12 December 2024**,** Ovidius University of Constanta, Constanta, Romania.

El-Naser, A. (2024). The Influence of the Shadow Economy and Corruption on Public Debt in European Union Countries pre and post-Covid-19.

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