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Exploring the Role of Bond Markets in Economic Growth: Evidence from a Split-Sample Analysis of EU Countries

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Abstract. This paper investigates the relationship between bond market development and economic growth across 27 European Union countries over the period 2005–2021. While financial development has traditionally focused on banking and equity markets, the role of bond markets in supporting long-term growth remains underexplored, particularly in the heterogeneous European context. Using panel regression techniques, pooled OLS, fixed effects, and random effects, this study examines how key indicators such as bond yields and corporate bond issuance influence GDP growth and GDP per capita growth. The analysis is further refined through a split-sample approach, distinguishing between above-average and below-average GDP economies to assess the role of financial maturity. Results show that bond yields consistently exhibit a negative relationship with growth across all models, with a stronger effect in lower-GDP countries, underscoring their vulnerability to borrowing costs. Surprisingly, corporate bond issuance is negatively associated with growth, suggesting inefficiencies or debt misallocation in both advanced and developing markets. Meanwhile, stock market capitalization remains a robust and positive driver of growth, particularly in more mature economies. The findings highlight the asymmetric performance of bond markets and emphasize the need for differentiated financial development policies across EU member states. These insights have critical implications for capital market integration efforts and call for more targeted strategies aligned with national financial structures.

Keywords. Bonds market, Economic growth, Financial development, Panel data analysis, European Union, Split-sample regression, Capital markets.

1. Introduction & Context

Economic growth is intricately linked to the efficiency and depth of financial markets. A well-developed financial system is ensuring the effective allocation of capital, supporting productive investment, and mitigating financial instability. While significant economic rationale often centers around equity markets, the bond market remains an equally essential driver of long-term economic growth. Bonds serve as an essential financing tool for both governments and corporations, providing a more stable and long-term alternative to bank lending. In recent decades, as European economies have sought to enhance financial stability and economic resilience, the role of bond markets in shaping growth trajectories has become increasingly relevant.

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The European financial landscape shows an interesting environment for analyzing the relationship between bond markets and economic growth. Unlike the United States, where corporate and municipal bond markets dominate capital financing, European economies have historically relied more on bank lending than on capital markets (Hardy & Schmieder, 2013). However, following the 2008 global financial crisis, policymakers across the EU recognized the need to diversify financial systems to reduce dependency on banks and enhance market-based financing options. The development of domestic bond markets became a central pillar of financial reform, with efforts such as the Capital Markets Union (CMU) aiming to deepen Europe's financial integration and improve access to non-bank financing (European Commission, 2015).

The disparities in financial market development persist across EU economies, despite these reforms. Advanced economies such as Germany, France, and the Netherlands have well-established bond markets, with deep pools of corporate and sovereign debt. In contrast, many Central and Eastern European (CEE) economies still exhibit shallower financial markets, with limited bond issuance activity and greater reliance on bank credit. These differences raise critical debates about whether bond market development contributes to economic growth in the same way across economies with different levels of financial maturity. It is important to understand if countries with deeper bond markets experience stronger, more sustained growth compared to those with weaker financial infrastructures, or if financial market development leads to diminishing or even adverse effects in less mature markets.

At a macroeconomic level, bond markets facilitate investment, particularly in long-term projects such as infrastructure, energy, and technological development. Countries with deeper bond markets tend to have lower borrowing costs, greater financial resilience, and more options for diversifying risk. Empirical research suggests that corporate bond issuance plays a crucial role in fostering business expansion, allowing companies to secure funding outside of traditional bank lending channels (Shin & Zhao, 2013). Similarly, sovereign bond markets provide governments with the fiscal flexibility to finance public investments without creating excessive burdens on national budgets. However, while these mechanisms are widely acknowledged, their impact is likely to differ depending on a country's economic and financial structure.

A key factor influencing these dynamics is GDP level and financial market maturity. Higher-income economies generally have more sophisticated financial systems, greater investor confidence, and stronger regulatory frameworks, factors that enhance the effectiveness of bond markets in promoting economic growth. Conversely, lower-income economies, particularly those in emerging Europe, often face higher borrowing costs, lower market liquidity, and weaker investor participation, which may limit the positive spillovers of bond market activity. For these situations, it is unsure whether bond market expansion still contributes to growth or if it is overshadowed by structural constraints such as limited financial infrastructure and macroeconomic volatility.

In order to address these concerns, the present study examines firstly the overall relationship between bond market development and economic growth across all European economies. Secondly, to assess whether financial market maturity influences these effects, we conduct a split-sample analysis, distinguishing between economies with above-average and below-average GDP levels. By comparing these subgroups, we aim to examine whether bond markets function as consistent drivers of growth across different economic contexts or if their effects vary significantly based on financial market maturity.

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Understanding these macroeconomic differences is critical, especially as European policymakers seek to build more resilient financial markets in the face of growing global uncertainties. The past decade has demonstrated how economic shocks, ranging from the Eurozone debt crisis to the COVID-19 pandemic and recent inflationary pressures, can disrupt financial stability and reshape capital market behavior. In this context, the ability of bond markets to absorb shocks and sustain economic activity has become an even more pressing concern.

This research papers situates itself within this broader economic landscape, investigating the relationship between bond market development and economic growth across European economies. By distinguishing between higher-GDP and lower-GDP countries, the analysis explores whether the role of bond markets in fostering growth is contingent on financial maturity and macroeconomic conditions. Given the EU's push for greater capital market integration, the findings can offer insights into how bond markets function as engines of growth in economies with varying levels of development.

2. Literature Review

The connection between financial markets and economic growth has been the subject of extensive debate, with much of the early research focusing on banks and equity markets as the primary engines of financial development (Levine, 2005; Beck & Levine, 2004). However, the bond markets have often played a secondary role in these discussions, even if their role is as crucial to long-term economic expansion. Their importance, however, has become increasingly evident, particularly as economies worldwide are shifting towards more diversified financial structures. Bonds provide long-term, stable financing, offering an alternative to the cyclical nature of bank credit and the volatility of stock markets. Whether in government borrowing, corporate expansion, or infrastructure investment, well-developed bond markets offer a mechanism for growth that can operate independently of banking sector conditions.

Despite the theoretical appeal of bond market development, its impact on economic growth is neither uniform nor universally positive. Some economies thrive with deep and liquid bond markets, benefiting from efficient capital allocation and reduced financing constraints (De Fiore & Uhlig, 2015), while others face liquidity traps, high borrowing costs, or regulatory inefficiencies that limit these benefits (Burger, Warnock, & Warnock, 2015). In short, the impact of bond markets depends on multiple factors, being shaped by the financial infrastructure, investor confidence, and institutional quality of a country.

The bond markets serve as intermediaries between borrowers and investors, facilitating long-term financing for governments and corporations. Sovereign bond markets allow governments to fund public investment, smooth fiscal deficits, and implement countercyclical policies which play a vital role in macroeconomic stability (ECB, 2021). Meanwhile, corporate bond markets provide businesses with an alternative to bank financing, reducing dependence on credit institutions and broadening the available investment opportunities (Thumrongvit, Kim, & Pyun, 2013). This diversification of financing sources is especially important during periods of banking distress, where restricted lending can hinder business expansion.

However, the empirical evidence on bond markets' contribution to economic growth presents a more nuanced picture. Several studies confirm that bond market development fosters economic stability and investment efficiency, particularly in economies with strong financial institutions. Boubaker et al. (2019) show that liquid and well-regulated bond markets attract foreign capital, lower borrowing costs, and facilitate sustainable fiscal management. Similarly, Pradhan et al. (2020) highlight that in G-20 economies, bond market deepening has played an

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essential role in supporting economic growth by enhancing capital mobility and reducing financing constraints.

However, other studies present a different scenario, particularly for emerging economies or those with weaker financial systems. Burger, Warnock, & Warnock (2015) warn that without sufficient liquidity and investor confidence, bond markets may fail to deliver their expected growth-enhancing effects. For these economies, bank lending still dominates as the primary financing source, and bond market development may be constrained by regulatory inefficiencies, limited secondary market activity, or an over-reliance on sovereign debt issuance.

Additionally, the "too much finance" hypothesis in the literature add on this environment. Arcand, Berkes, & Panizza (2015) argue that beyond a certain threshold, excessive financial deepening can yield diminishing returns, potentially crowding out productive investment and leading to misallocation of resources. In extreme cases, excessive sovereign debt accumulation facilitated by bond markets, can undermine economic stability rather than enhance it (Reinhart & Rogoff, 2010). This raises an important question if the expansion of bond markets always contributes to growth, or does its impact vary depending on financial maturity, institutional quality, and economic conditions.

One of the most important findings in financial development literature is that bond markets do not function uniformly across different economies. Advanced economies, which are typically characterized by deep capital markets, strong regulatory institutions, and well-diversified investor bases, experience greater benefits from bond market expansion (OECD, 2024). Countries like Germany, France, and the Netherlands have long-established bond markets that operate alongside traditional banking systems, complementing rather than competing with them.

However, for many Southern and Eastern European economies, the environment is quite different. These countries often face higher borrowing costs, less liquidity, and weaker investor participation, making it harder for bond markets to serve as effective financing mechanisms (Wahidin, Akimov, & Roca, 2021). In such cases, bond market deepening does not always translate into higher growth, as financing constraints persist despite increased bond issuance.

Ayyagari, Demirgüç-Kunt, & Maksimovic (2013) provide further evidence that institutional quality plays a decisive role in whether bond markets effectively support economic expansion. In economies where financial oversight is weak, markets remain underdeveloped, or investor confidence is low, bond issuance may fail to stimulate productive investment. Instead, capital may be diverted toward less efficient sectors, contributing to financial distortions rather than sustained growth.

Multiple research papers from the scientific literature treat bond markets as a uniform driver of growth, without considering whether their effects vary based on financial structure and economic maturity. Addressing this issue is crucial, particularly in the European context, where a wide range of financial systems exist within a shared economic framework.

While the literature broadly supports the notion that bond markets contribute to financial deepening and economic stability, it also suggests that these effects are contingent on a country's financial structure. Most studies comparing financial market development are comparing advanced and developing economies on a global scale, but the European reality is more complex.

Europe presents a unique case for analysis because it includes both highly developed financial centers and economies still transitioning from bank-dominated systems to more

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market-based financing models. While Western and Northern European countries exhibit deep, liquid, and resilient bond markets, Southern and Eastern European nations often experience financing constraints, high sovereign risk premiums, and limited market participation.

The present study study builds on existing research by distinguishing between countries with above-average and below-average GDP levels, analyzing whether bond markets contribute to growth differently depending on financial market maturity. By implementing a split-sample approach, the study explores whether the relationship between bond markets and economic growth is stronger in advanced economies, where markets are already well-established, or whether its impact is equally significant in lower-GDP economies seeking financial expansion.

As Europe navigates economic realignments, inflationary pressures, and capital market integration efforts, understanding these dynamics is more important than ever. The findings will provide insights into whether bond market policies should be uniformly applied across economies or tailored to the specific needs of countries at different stages of financial development.

The role of bond markets in economic growth is neither straightforward nor universal. While a well-developed bond market can provide stable financing, diversify investment risks, and reduce dependency on bank credit, its effectiveness depends on financial market maturity, institutional quality, and macroeconomic stability.

By integrating a split-sample analysis, this research paper offers a more nuanced perspective on how bond markets function across different financial systems. Given the heterogeneity of European economies, this approach provides valuable insights into whether capital market policies should be tailored to reflect differences in financial development.

As Europe continues to push for greater financial integration, policymakers must consider not just how to expand bond markets, but where and under what conditions they contribute most effectively to long-term economic growth.

3. Methodology

Financial markets are more than just a mechanism for raising capital, contributing to shaping the structure of economic growth. As businesses and governments seek financing beyond traditional bank lending, bond markets have become an increasingly important tool, influencing investment patterns, corporate expansion, and fiscal sustainability.

However, the extent to which bond markets support economic growth remains an open question, particularly in economies with different levels of financial maturity. This study is examining this relationship by adopting a panel data framework that firstly it examines bond market development in Europe as a whole but also distinguishes between economies with above-average and below-average GDP levels.

The aim of this research paper is to study whether the bond markets contribute equally to economic growth across all economies, or their effects vary based on financial market maturity and structural economic differences. For this, we perform a rigorous empirical strategy, estimating both a general model for all countries and a split-sample model that separately analyzes high-GDP and low-GDP economies.

This study draws from 27 European economies with data spanning the period 2005–2021, capturing both advanced and emerging economies within the region. Data is sourced from Eurostat, the OECD's Database, and the World Bank's Global Financial Development Database, ensuring a comprehensive set of financial and macroeconomic indicators.

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To understand how bond markets influence economic growth, we define two dependent variables:

- Real GDP Growth Rate – The annual percentage change in real GDP, a measure of overall economic performance.
- Real GDP Growth Rate per Capita – Adjusted for population dynamics, this measure reflects improvements in individual economic well-being rather than aggregate expansion.

A well-functioning bond market is expected to enhance investment and facilitate financial stability, but the magnitude of this impact depends on financial structures. Thus, we focus on key explanatory variables that capture the scale and efficiency of bond market activity:

- Bond Yields (Bonds_yield) - The cost of borrowing for governments and corporations, reflecting investor sentiment, sovereign risk, and financial conditions.
- Corporate Bond Issuance to GDP (Corporate_bond_issuance_volume_to_GDP) - A measure of financial deepening, capturing firms' ability to secure non-bank financing for investment and expansion.
- Stock Market Capitalization to GDP (Stock_market_capitalization_to_GDP) - Reflecting the size of equity markets, this variable helps assess whether financial deepening is balanced between debt and equity financing.
- Gross Fixed Capital Formation to GDP (Gross_fixed_capital_formation_to_GDP) - Investment in infrastructure, machinery, and production capacity, a fundamental driver of long-term growth.
- Infrastructure Investment to GDP (Infrastructure_investment_to_GDP) - Critical for sustaining economic competitiveness, as transport, energy, and communication networks drive efficiency.
- HICP Inflation Rate (HICP_inflation_rate) - A control variable for macroeconomic stability, as inflation affects borrowing costs, financial conditions, and overall economic expansion.

To quantify the relationship between bond markets and economic growth, we estimate the following panel regression model:

$$\text{Real GDP Growth}_{it} = \beta_0 + \beta_1 \text{ Bonds Yield}_{it} + \beta_2 \text{ Corporate Bond Issuance}_{it} + \beta_3 \text{ Stock Market Capitalization}_{it} + \beta_4 \text{ Gross Fixed Capital Formation}_{it} + \beta_5 \text{Infrastructure Investment}_{it} + \beta_6 \text{ HICP Inflation Rate}_{it} + \epsilon_{it}$$

where i represents the country, t represents the year, and ϵit is the error term.

Recognizing that European economies vary significantly in financial structures, we employ three estimation techniques to ensure robustness:

1. **Pooled OLS Model** – This approach assumes a common relationship across all countries, providing a baseline estimate of bond markets' impact on growth.
2. **Fixed Effects Model** – By controlling for country-specific unobserved heterogeneity, this model isolates within-country effects, addressing potential bias from structural differences across economies.
3. **Random Effects Model** – This specification allows for variation across countries while maintaining efficiency in the estimation process

In order to validate the fitness of the chosen models, we conduct a series of diagnostic and robustness tests, including:

- Ramsey RESET Test - To assess whether the model suffers from omitted variable bias, ensuring specification robustness.

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- Breusch-Pagan Test - To check for heteroskedasticity in residuals, which would necessitate the use of robust standard errors.
- Wooldridge Test - To examine the presence of serial correlation, which can bias coefficient estimates in panel models.
- F-Test for Fixed Effects - To test whether country-specific effects significantly improve the model fit over pooled OLS.
- Hausman Test - To determine whether a fixed effects or random effects model is more suitable.

The results of the diagnostic and robustness tests are included in the Appendix.

A single, aggregated model is helpful to understand the overall relation between bonds market and economic growth, but it does not capture the structural differences that exist between financially mature and financially developing economies. To explore this, we conduct a split-sample regression for countries classified as Above-Average GDP and Below-Average GDP.

- In high-GDP economies, bond markets are generally deep, liquid, and well-integrated, so we expect a stronger positive impact of bond issuance and financial depth on growth.
- In lower-GDP economies, weaker investor confidence, less-developed capital markets, and higher borrowing costs might limit the growth-enhancing effects of bond markets, or even lead to adverse outcomes.

By running separate regressions, we capture these differences, providing insights into whether financial development policies should be tailored rather than uniformly applied across all economies.

The results of the diagnostic and robustness tests for both groups, above-average GDP and below-average GDP countries, are included in the Appendix.

To ensure the reliability of our research paper, we considered the following steps to be necessary:

- Alternative Growth Measures: To check consistency, we estimate models with both Real GDP Growth Rate and Real GDP Growth Rate per Capita.
- Robust Standard Errors: Accounting for potential heteroskedasticity to avoid misleading significance levels.

Financial markets do not operate in a controlled environment, they evolve based on institutional frameworks, investor confidence, and economic conditions. By recognizing these complexities, the study moves beyond the traditional one-size-fits-all approach to bond market analysis.

The findings from this study have direct implications for monetary policymakers, investors, and financial regulators, especially as Europe moves toward greater capital market integration. If bond markets function differently in high- and low-GDP economies, financial reforms should reflect these distinctions, rather than applying uniform policies across very diverse economies.

4. Results and Interpretation

Understanding the relationship between bond markets and economic growth requires more than just a general overview on European countries, it also requires attention to the diversity within the European landscape. The initial approach in this paper uses a general model, covering all 27 European Union countries in the sample, to estimate the average effect of bond

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market variables on economic growth. This broader model sets the foundation for understanding baseline dynamics across the region.

Across all estimation methods, namely the pooled OLS, fixed effects, and random effects models, the results consistently indicate that bond yields have a statistically significant and negative relationship on real GDP growth, both in aggregate and per capita terms. In the random effects specification, which diagnostic testing supported as the most appropriate model, a one-percentage-point increase in bond yields is associated with a decline of roughly 0.67 percentage points in GDP growth and 0.63 percentage points in GDP per capita growth. These findings align with the broader literature suggesting that higher borrowing costs can constrain investment and slow down economic activity (Reinhart & Rogoff, 2010).

The following tables present the results for model 1 (using real GDP growth rate as a dependent variable) and model 2 (using real GDP per capital growth rate as a dependent variable for the entire sample of EU countries:

Table 1. Outputs for the model using Real GDP growth rate as a dependent variable – full sample (27 EU countries)

	Real_GDP_growth_rate		
	Pooled OLS	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.614*** (0.080)	-0.745*** (0.095)	-0.667*** (0.079)
Corporate_bond_issuance_volume_to_GDP	-0.455*** (0.134)	-0.440** (0.159)	-0.480*** (0.137)
Gross_fixed_capital_formation_to_GDP	0.113* (0.061)	0.113 (0.091)	0.111* (0.056)
Infrastructure_investment_to_GDP	0.003 (0.004)	-0.003 (0.005)	0.001 (0.004)
Stock_market_capitalization_to_GDP	0.019*** (0.006)	0.028*** (0.007)	0.022*** (0.005)
HICP_inflation_rate	0.427*** (0.121)	0.434*** (0.118)	0.431*** (0.104)
R-squared	**21.19%**	**23.02%**	**21.76%**
Adjusted R-squared	**19.90%**	**16.28%**	**20.48%**

Source: Author's own research; Data from Eurostat, OECD and World Bank

Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

Table 2. Outputs for the model using Real GDP growth rate per capita as a dependent variable – full sample (27 EU countries)

	Real_GDP_growth_rate_per_capita		
Variable	**Pooled OLS**	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.599*** (0.082)	-0.720*** (0.089)	-0.634*** (0.080)
Corporate_bond_issuance_volume_to_GDP	-0.577*** (0.133)	-0.426** (0.151)	-0.573*** (0.134)
Gross_fixed_capital_formation_to_GDP	0.059	0.078	0.065

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	Real_GDP_growth_rate_per_capita		
Variable	**Pooled OLS**	**Fixed Effects**	**Random Effects**
	(0.062)	(0.096)	(0.061)
Infrastructure_investment_to_GDP	0.007 (0.004)	-0.004 (0.005)	0.004 (0.004)
Stock_market_capitalization_to_GDP	0.011* (0.006)	0.027*** (0.007)	0.014* (0.006)
HICP_inflation_rate	0.471*** (0.114)	0.425*** (0.115)	0.453*** (0.102)
R-squared	**21.12%**	**20.43%**	**20.00%**
Adjusted R-squared	**19.83%**	**13.47%**	**18.70%**

Source: Author's own research; Data from Eurostat, OECD and World Bank
Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

Another key finding is the negative impact of corporate bond issuance on economic growth. Contrary to conventional expectations that present deeper corporate bond markets signaling greater financial development, the results point to a significant negative relationship, most probably caused by the structural differences across countries in EU. Thus, in less mature markets, increased bond issuance may reflect short-term liquidity needs rather than long-term investment strategies, potentially leading to inefficiencies. The above results are in line with the concerns raised by Arcand et al. (2015) on the "too much finance" hypothesis, where excessive financial deepening may begin to work against sustainable economic expansion.

Stock market capitalization, on the other hand, is positively and significantly correlated with both GDP growth rate and per capita GDP growth rate. This suggests that equity markets, even when analyzed alongside bond market activity, continue to provide a complementary role in fostering growth, supporting earlier findings in Levine (2005) and Thumrongvit et al. (2013). As such, the interaction between bond and equity market development appears to be a critical dynamic in shaping macroeconomic performance.

Other macroeconomic indicators show rather mixed results. Gross fixed capital formation exhibits a weak positive impact, and infrastructure investment, while important in theory, does not show a significant driver in the full sample of 27 EU countries. The results suggest that while investment remains important, its impact on economic growth is likely dependent on more financial conditions, institutional quality, and the efficiency of capital allocation rather than the level of investment itself.

Inflation, as measured by the HICP rate, shows a strong positive association with growth, possibly reflecting underlying cyclical pressures rather than destabilizing inflationary trends. This finding aligns with prior research on the Phillips curve relationship, indicating that moderate inflation levels may reflect robust economic activity and rising demand, particularly in economies recovering from financial slowdowns.

While the general model provides important insights, it also smooths over significant structural differences between economies. For this reason, we go further into a split-sample analysis, dividing countries into above-average and below-average GDP groups. This allows us to explore whether bond markets function similarly across diverse financial systems or whether their effects are conditional on economic maturity.

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The following table shows model outputs for the model using real GDP growth rate as a dependent variable for the above-average GDP country group:

Table 3. Outputs for the model using Real GDP growth rate as a dependent variable – above-average sample

	Real_GDP_growth_rate		
	Pooled OLS	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.277** (0.099)	-0.695** (0.244)	-0.308** (0.101)
Corporate_bond_issuance_volume_to_GDP	-0.253** (0.083)	-0.387** (0.128)	-0.271** (0.084)
Gross_fixed_capital_formation_to_GDP	0.145*** (0.021)	-0.089 (0.049)	0.132*** (0.017)
Infrastructure_investment_to_GDP	-0.020 (0.018)	-0.055*** (0.015)	-0.022 (0.018)
Stock_market_capitalization_to_GDP	0.021** (0.006)	0.031*** (0.007)	0.021*** (0.006)
HICP_inflation_rate	0.193 (0.323)	0.727*** (0.176)	0.229 (0.308)
R-squared	**11.88%**	**22.86%**	**12.43%**
Adjusted R-squared	**8.28%**	**14.47%**	**8.86%**

Source: Author's own research; Data from Eurostat, OECD and World Bank
Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

Moreover, the model outputs for the model using real GDP growth rate per capita as a dependent variable is presented below for the above-average GDP country group:

Table 4. Outputs for the model using Real GDP growth rate per capita as a dependent variable – above-average sample

	Real_GDP_growth_rate_per_capita		
Variable	**Pooled OLS**	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.270** (0.101)	-0.654** (0.233)	-0.270** (0.101)
Corporate_bond_issuance_volume_to_GDP	-0.330*** (0.076)	-0.374** (0.112)	-0.330*** (0.076)
Gross_fixed_capital_formation_to_GDP	0.088*** (0.019)	-0.132* (0.054)	0.088*** (0.019)
Infrastructure_investment_to_GDP	-0.028 (0.019)	-0.062*** (0.017)	-0.028 (0.019)
Stock_market_capitalization_to_GDP	0.016** (0.005)	0.031*** (0.006)	0.016** (0.005)
HICP_inflation_rate	0.152 (0.315)	0.680*** (0.181)	0.152 (0.315)
R-squared	**12.48%**	**22.68%**	**12.48%**

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	Real_GDP_growth_rate_per_capita		
Variable	**Pooled OLS**	**Fixed Effects**	**Random Effects**
Adjusted R-squared	**8.91%**	**14.28%**	**8.91%**

Source: Author's own research; Data from Eurostat, OECD and World Bank
Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

The split-sample analysis begins with the group of countries exhibiting above-average GDP levels, typically representing financially mature and institutionally developed economies within European Union. For these countries, it is expected that bond markets will play a more efficient and stabilizing role in supporting economic growth and the following evidence partially supports this general approach.

Across both models, the bond yield variable remains negative and statistically significant, particularly under the fixed and random effects specifications. This suggests that higher borrowing costs continue to constrain economic growth, even in mature financial systems, a result aligned with general economic theory and previous findings (Reinhart & Rogoff, 2010). However, the magnitude of this effect is slightly smaller than in the below-average sample, hinting that advanced economies may be better equipped to absorb interest rate shocks due to diversified financing channels and stronger investor confidence.

Notably, corporate bond issuance retains a negative and significant coefficient in all three models for the above-average group. While counterintuitive, this pattern continues the finding from the general model: in financially advanced economies, rising corporate bond issuance does not necessarily equate to growth. This could reflect potential over-leverage or diminishing marginal returns to debt, supporting Arcand, Berkes, and Panizza's (2015) caution against "too much finance." It may also point toward bond issuance being used to refinance debt or fund share buybacks rather than fuel productive investment.

The stock market capitalization variable remains positive and robust, particularly in the fixed effects model. This supports the idea that well-functioning equity markets, which are often complementary to bond markets, continue to play a key role in supporting investment and corporate expansion. These findings resonate with Levine (2005), who emphasized the dynamic relationship between equity markets and economic performance in financially deep systems.

Surprisingly, infrastructure investment exhibits a significant negative relationship with growth in the fixed effects model, reflecting inefficiencies or overinvestment in low-return projects, or even timing effects where large infrastructure spending occurs in reaction to slowdowns rather than as a proactive growth stimulus. On the other hand, gross fixed capital formation displays weak or mixed results, suggesting that in high-income economies, not all investment directly translates into growth, the quality and efficiency of capital allocation matter.

Finally, inflation continues to show a significant and positive relationship with GDP growth in both models, though it should be interpreted cautiously. It may reflect inflation that accompanies rising demand in more dynamic economies, rather than any direct causal mechanism.

The following table shows model outputs for the model using real GDP growth rate as a dependent variable for the below-average GDP country group:

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Table 5. Outputs for the model using Real GDP growth rate as a dependent variable – below-average sample

	Real_GDP_growth_rate		
	Pooled OLS	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.718*** (0.083)	-0.775*** (0.116)	-0.718*** (0.083)
Corporate_bond_issuance_volume_to_GDP	-1.066* (0.420)	-0.422 (0.589)	-1.066* (0.420)
Gross_fixed_capital_formation_to_GDP	0.084 (0.085)	0.271 (0.144)	0.084 (0.085)
Infrastructure_investment_to_GDP	0.003 (0.004)	0 (0.006)	0.003 (0.004)
Stock_market_capitalization_to_GDP	0.01 (0.010)	-0.002 (0.012)	0.01 (0.010)
HICP_inflation_rate	0.444*** (0.127)	0.291. (0.162)	0.444*** (0.127)
R-squared	**29.85%**	**28.04%**	**29.85%**
Adjusted R-squared	**27.88%**	**20.81%**	**27.88%**

Source: Author's own research; Data from Eurostat, OECD and World Bank
Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

Moreover, the model outputs for the model using real GDP growth rate per capita as a dependent variable is presented below for the below-average GDP country group:

Table 6. Outputs for the model using Real GDP growth rate per capita as a dependent variable – below-average sample

	Real_GDP_growth_rate_per_capita		
Variable	**Pooled OLS**	**Fixed Effects**	**Random Effects**
Bonds_yield	-0.708*** (0.082)	-0.755*** (0.111)	-0.708*** (0.082)
Corporate_bond_issuance_volume_to_GDP	-1.167** (0.433)	-0.410 (0.606)	-1.167** (0.433)
Gross_fixed_capital_formation_to_GDP	0.052 (0.098)	0.241 (0.154)	0.052 (0.098)
Infrastructure_investment_to_GDP	0.006 (0.004)	-0.001 (0.006)	0.006 (0.004)
Stock_market_capitalization_to_GDP	-0.005 (0.010)	-0.008 (0.012)	-0.005 (0.010)
HICP_inflation_rate	0.466*** (0.134)	0.285* (0.162)	0.466*** (0.134)
R-squared	**29.66%**	**25.32%**	**29.66%**
Adjusted R-squared	**27,68%**	**17.81%**	**27.68%**

Source: Author's own research; Data from Eurostat, OECD and World Bank
Note: *** means significant at 0.01 level; ** means significant at 0.05 level; * means significant at 0.10 level.

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Turning to the below-average GDP countries, the findings become more polarized and, in many ways, more revealing. These economies typically represent financially developing markets with shallower capital markets, lower investor depth, and more volatile macroeconomic environments.

One of the most consistent results here is the very strong and negative effect of bond yields on both GDP growth measures, especially under the pooled and random effects models. The magnitude of this effect is substantially larger than in the above-average sample, highlighting the greater sensitivity of developing economies to borrowing costs. High interest rates appear to significantly constrain economic growth, likely reflecting fragile investor environments and tighter credit conditions.

The role of corporate bond issuance is once again negative and significant under pooled and random effects, but becomes statistically insignificant under fixed effects. This indicates that while corporate bond issuance may still not translate into productive growth in developing economies, the variability across countries may dilute the within-country effect. As in the general model, this aligns with concerns that bond markets in developing economies are often underutilized or inefficient, with limited channels for broad-based productive investment.

In contrast to the high-GDP group, stock market capitalization and investment variables (gross fixed capital formation and infrastructure investment) are not significantly associated with growth in the below-average sample. This highlights a core issue: in financially constrained economies, the presence of capital markets alone is not sufficient. Structural issues, such as weak institutional frameworks, low investor confidence, and limited secondary market liquidity, may undermine the effectiveness of financial deepening.

A positive and significant effect of inflation on growth remains visible in the random effects models. While this may reflect temporary price pressures accompanying post-crisis recovery periods or nominal adjustments in developing economies, the finding should again be interpreted cautiously, inflation-growth dynamics are highly nonlinear and dependent on broader policy frameworks.

Based on the results presented above for both split sample analyses, namely the above-average GDP countries and the below-average GDP group, the following comparative findings are highlighted:

- Bond yields are hindering economic growth across all samples, but the effect is stronger in lower-GDP economies, where financial fragility magnifies the cost of capital.
- Corporate bond issuance shows consistent negative or neutral effects, possibly reflecting excessive reliance on debt financing or unproductive borrowing, especially in less mature markets.
- Stock markets matter more in advanced economies, where equity markets are deeper, more liquid, and better integrated with the real economy.
- Investment variables are only weakly significant or even negative in some models, suggesting that the efficiency of capital deployment, not just its quantity, determines economic outcomes.
- Inflation remains positively associated with growth, though this likely reflects pro-cyclical inflation or structural price dynamics rather than causality.

Considering all the findings presented above, the split sample estimations illustrate a core insight: bond markets do not operate uniformly across the European Unions. In financially mature economies, their contribution to economic growth is nuanced, with equity markets and capital efficiency playing key roles. In developing economies, however, bond markets remain

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a fragile tool, being easily disrupted by interest rate volatility and often lacking the depth to channel capital into productive investments.

This heterogeneity reinforces the need for tailored financial development strategies, rather than blanket policies, particularly in a region as diverse as Europe. The effectiveness of bond markets as engines of growth depends not only on their size, but on the underlying institutional, regulatory, and macroeconomic environments in which they operate.

The comparative results between above- and below-average GDP countries offer several important policy insights. Most notably, bond markets do not function as universal growth engines. Their effectiveness is shaped by borrowing conditions, institutional frameworks, and the broader structure of financial markets.

In advanced economies, policymakers should focus on ensuring that bond markets remain transparent, well-regulated, and linked to productive investment. The consistent negative relationship between bond issuance and growth suggests that monitoring corporate leverage and aligning debt issuance with long-term economic priorities is essential. Strengthening disclosure requirements, enhancing credit risk assessments, and encouraging investment into infrastructure, innovation, and green projects can help align bond market activity with sustainable growth.

In developing economies, financial policies should avoid prioritizing market expansion without first addressing institutional capacity, regulatory gaps, and investor depth. The strong negative response to higher bond yields in these countries suggests that macroeconomic stability and fiscal credibility are preconditions for functional capital markets. Rather than fast-tracking corporate bond issuance, the focus should be on building local investor bases, reducing dependence on short-term foreign capital, and expanding financial literacy and credit rating coverage.

Furthermore, the complementary role of equity markets, particularly in high-GDP countries, points toward the need for balanced capital market development. A more integrated and inclusive financial ecosystem, where firms can raise equity or debt depending on their needs, would better support economic growth across varying economic environments. EU-wide initiatives like the Capital Markets Union must therefore remain sensitive to national disparities and tailor financial deepening strategies accordingly.

By reflecting the distinct roles bond markets play across economic contexts, financial policy can move from a generalized vision of capital market expansion to one rooted in structural realism and growth efficiency.

5. Conclusion and Future Research Directions

This paper investigated the relationship between bond market development and economic growth across EU countries, using both general and split-sample models. The findings show that while bond yields negatively affect growth across the entire sample, the impact is stronger in lower-GDP countries, reflecting their higher financial vulnerability. Conversely, higher-GDP countries appear more resilient, though bond yields still impose constraints.

A notable and consistent result is the negative association between corporate bond issuance and growth, challenging the assumption that deeper bond markets universally support economic performance. This may reflect inefficient capital use, debt-driven strategies, or structural weaknesses, particularly in less mature markets. Meanwhile, stock market capitalization positively correlates with growth in advanced economies, underlining the importance of balanced capital market development.

The split-sample analysis confirmed that bond markets do not operate uniformly across financial systems. These findings show the importance of differentiated policy approaches, strengthening institutional capacity and investor confidence in developing markets, while aligning bond issuance with productive investment in mature economies.

Future research could explore the role of institutional quality, distinguish between public and private bond effects, and assess sector-specific impacts. Including post-2021 data will also help evaluate how recent economic shocks have shaped bond market dynamics.

In a financially diverse region like the European Union, understanding where and under what conditions bond markets support growth is key. This study emphasizes the need for tailored strategies that go beyond a one-size-fits-all approach to financial development.

References

[1] Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. Journal of Banking & Finance, 28(3), 423–442.
[2] Levine, R. (2005). Finance and growth: Theory and evidence. In Handbook of Economic Growth (Vol. 1A, pp. 865–934).
[3] Hardy, D. C., & Schmieder, C. (2013). Rules of thumb for bank solvency stress testing. IMF Working Papers, 13(232).
[4] European Commission. (2015). Action Plan on Building a Capital Markets Union. Brussels.
[5] Shin, H. S., & Zhao, L. (2013). Firms as liquidity providers: Evidence from the 2007–2008 financial crisis. IMF Economic Review, 61(2), 223–252.
[6] Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? Journal of Economic Growth, 20, 105–148.
[7] Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. American Economic Review, 100(2), 573–578.
[8] Thumrongvit, P., Kim, Y., & Pyun, C. S. (2013). Linking the missing market: The effect of bond markets on economic growth. International Review of Economics & Finance, 27, 529–541.
[9] De Fiore, F., & Uhlig, H. (2015). Corporate debt structure and the financial crisis. Journal of Money, Credit and Banking, 47(6), 1119–1152.
[10] Burger, J. D., Warnock, F. E., & Warnock, V. C. (2015). Bond market development in developing Asia. ADB Economics Working Paper Series, No. 448.
[11] Boubaker, S., Nguyen, D. K., Piljak, V., & Savvides, A. (2019). Financial development, government bond returns, and stability: International evidence. Journal of International Financial Markets, Institutions and Money, 61, 81–96.
[12] Pradhan, R. P., Arvin, M. B., Norman, N. R., & Bahmani, S. (2020). The dynamics of bond market development, stock market development and economic growth. Journal of Economics, Finance and Administrative Science, 25(49), 119–148.
[13] Wahidin, D., Akimov, A., & Roca, E. (2021). The impact of bond market development on economic growth before and after the global financial crisis: Evidence from developed and developing countries. International Review of Financial Analysis, 77, 101865.
[14] Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2013). Financing in Developing Countries. In Handbook of the Economics of Finance (Vol. 2A, pp. 677–735).
[15] Demirgüç-Kunt, A., & Maksimovic, V. (1998). Law, finance, and firm growth. Journal of Finance, 53(6), 2107–2137.

[16] OECD. (2024). Global Debt Report: Bond Markets in a High-Debt Environment. Paris: OECD Publishing.
[17] Fink, G., Haiss, P. R., & Hristoforova, S. (2003). Bond markets and economic growth. Research in International Business and Finance, 17(3), 291–305.
[18] Gertler, M., & Rogoff, K. (1990). North-South lending and endogenous capital-market inefficiencies. Journal of Monetary Economics, 26(2), 245–266.
[19] European Central Bank (ECB). (2021). Financial Integration and Structure in the Euro Area. ECB Annual Report.
[20] International Capital Markets Association. (2023). Bond Markets to Meet EU Investment Challenges.
[21] Mazzacurati, J., Paris, W., & Tsiotras, A. (2021). Environmental impact and liquidity of green bonds. ESMA Report on Trends, Risks and Vulnerabilities, 2, 95–105.
[22] Climate Bonds Initiative. (2023). Sustainable Debt Global State of the Market 2023.
[23] Pagano, M., Panetta, F., & Zingales, L. (2018). Why do companies go public? An empirical analysis. Journal of Finance, 53(1), 27–64.
[24] Eurostat. (2023). Macroeconomic and Financial Data on EU Member States.
[25] OECD Database. (2023). Financial Market Indicators.
[26] World Bank. (2023). Global Financial Development Database.

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Appendix

Table 7. Descriptive statistics

Variable	No. of observations	Mean	Standard deviation	Median	Minimum	Maximum	Skewness	Kurtosis	Standard error
Real GDP growth rate	374	0.02	0.04	0.02	-0.16	0.25	-0.30	4.39	0.0021
Real GDP growth rate per capita	374	0.02	0.04	0.02	-0.15	0.23	-0.10	3.28	0.0021
Bonds yield	374	0.03	0.03	0.03	-0.01	0.22	1.83	8.62	0.0014
Corporate bond issuance volume to GDP	374	0.02	0.02	0.01	0.00	0.17	3.27	15.49	0.0011
Gross fixed capital formation to GDP	374	0.22	0.04	0.22	0.11	0.53	1.42	8.06	0.0022
Infrastructure investment to GDP	374	0.99	0.54	0.85	0.06	3.20	1.36	1.93	0.0278
Stock market capitalization to GDP	374	0.31	0.37	0.23	0.00	3.22	2.37	11.30	0.0191
HICP inflation rate	374	0.02	0.02	0.02	-0.02	0.15	1.86	7.44	0.0010

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 8. Correlation matrix

	Real GDP growth rate	Real GDP growth rate per capita	Bonds yield	Corporate bond issuance volume to GDP	Gross fixed capital formation to GDP	Infrastructure investment to GDP	Stock market capitalization to GDP	HICP inflation rate
Real GDP growth rate	1.00	0.98	-0.26	-0.11	0.27	0.06	0.03	0.19
Real GDP growth rate per capita	0.98	1.00	-0.20	-0.22	0.24	0.13	-0.07	0.21
Bonds yield	-0.26	-0.20	1.00	-0.27	-0.09	0.32	0.02	0.32
Corporate bond issuance volume to GDP	-0.11	-0.22	-0.27	1.00	-0.12	-0.26	0.45	-0.18
Gross fixed capital formation to GDP	0.27	0.24	-0.09	-0.12	1.00	0.32	-0.13	0.43
Infrastructure investment to GDP	0.06	0.13	0.32	-0.26	0.32	1.00	-0.12	0.34
Stock market capitalization to GDP	0.03	-0.07	0.02	0.45	-0.13	-0.12	1.00	-0.05
HICP inflation rate	0.19	0.21	0.32	-0.18	0.43	0.34	-0.05	1.00

Source: Author's own research; Data from Eurostat, OECD and World Bank

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Table 9. Robustness checks outputs – Model using real GDP growth rate as a dependent variable, full sample (27 EU countries)

Test	Real_GDP_growth_rate	
	Statistic	p-value
Studentized Breusch-Pagan test	BP = 4.3703	0.6267
RESET test	RESET = 0.0044562	0.9468
Wooldridge's test for serial correlation in FE panels	F = 2.3775	0.1240
F test for individual effects	F = 2.1213	0.0019
Hausman Test	chisq = 10.297	0.1127

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 10. Robustness checks outputs – Model using real GDP growth rate per capita as a dependent variable, full sample (27 EU countries)

	Real_GDP_growth_rate_per_capita	
	Statistic	p-value
Studentized Breusch-Pagan test	BP = 5.9015	0.4343
RESET test	RESET = 0.0044562	0.9468
Wooldridge's test for serial correlation in FE panels	F = 3.381	0.0668
F test for individual effects	F = 2.3245	0.0005
Hausman Test	chisq = 26.67	0.0002

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 11. Robustness checks outputs – Model using real GDP growth rate as a dependent variable, above-average sample

Test	Real_GDP_growth_rate	
	Statistic	p-value
Studentized Breusch-Pagan test	BP = 8.3723	0.2121
RESET test	RESET = 2.2034	0.1400
Wooldridge's test for serial correlation in FE panels	F = 0.1329	0.7160
F test for individual effects	F = 3.9282	0.0002
Hausman Test	chisq = 49.843	<0.0001

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 12. Robustness checks outputs – Model using real GDP growth rate per capita as a dependent variable, above-average sample

	Real_GDP_growth_rate_per_capita

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	Statistic	p-value
Studentized Breusch-Pagan test	BP = 7.4596	0.2804
RESET test	RESET = 3.6363	0.0586
Wooldridge's test for serial correlation in FE panels	F = 0.2733	0.6019
F test for individual effects	F = 3.0252	0.0025
Hausman Test	chisq = 21.876	0.0013

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 13. Robustness checks outputs – Model using real GDP growth rate as a dependent variable, below-average sample

Test	Real_GDP_growth_rate	
	Statistic	p-value
Studentized Breusch-Pagan test	BP = 5.3177	0.5038
RESET test	RESET = 9.3165	0.0026
Wooldridge's test for serial correlation in FE panels	F = 4.4100	0.0370
F test for individual effects	F = 1.4459	0.1349
Hausman Test	chisq = 14.146	0.0280

Source: Author's own research; Data from Eurostat, OECD and World Bank

Table 14. Robustness checks outputs – Model using real GDP growth rate per capita as a dependent variable, below-average sample

	Real_GDP_growth_rate_per_capita	
	Statistic	p-value
Studentized Breusch-Pagan test	BP = 8.467	0.2058
RESET test	RESET = 10.937	0.0011
Wooldridge's test for serial correlation in FE panels	F = 4.9615	0.0270
F test for individual effects	F = 1.6572	0.0672
Hausman Test	chisq = 54.753	0.0000

Source: Author's own research; Data from Eurostat, OECD and World Bank