

Financial Intermediation and Economic Growth: Empirical Evidence from the EU

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Abstract: Although the relationship between financial intermediation and economic growth has been widely investigated in both theoretical and empirical literature, there is still no consensus regarding its existence, intensity, direction, or functional form (linear vs. nonlinear). This study aims to empirically assess the nexus between financial development and economic growth in the 28 member states of the European Union (EU28) over the period 2000- 2021. Motivated by the recent Draghi Report (2024), which underscores the urgency of building a more integrated and efficient financial system to sustain long-term growth in the EU, our analysis explicitly explores the potential nonlinearity of this link. Using a panel data approach and applying the System Generalized Method of Moments (System GMM), we address endogeneity concerns and account for dynamic effects. Our results reveal a negative impact of the linear component of financial development on economic growth, while the squared term exhibits a positive and statistically significant effect. This U-shaped pattern suggests that the benefits of financial development materialize only after surpassing a certain threshold level. These findings carry important policy implications, particularly in the current context where the EU's financial sector is considered underdeveloped relative to other major global economies, emphasizing the need for structural reforms to enhance its catalytic role in promoting sustainable growth.

Keywords: financial development; economic growth; causality; EU countries.

JEL classification: E44; G21; O11; O16; O43.

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1. INTRODUCTION

It is widely acknowledged that a high standard of living can only be achieved through an increase in the production of goods and services, and thus, through economic growth. Studies on the topic (Hassan *et al.*, 2011; Prochniak and Wasiak, 2017; Afonso and Blanco-Arana, 2022) highlight the existence of several factors that can be considered drivers of economic growth, among which the financial system stands out. The institutional framework of the financial system, as well as its performance, represents a fundamental pillar for macroeconomic performance. Therefore, the vital importance of studying the association between financial development and economic growth is emphasized.

Although the relationship between the level of financial intermediation development and economic growth has been extensively explored, previous research presents mixed and sometimes contradictory results.

Prior to the financial crisis, the literature largely focused on the linear relationship between these variables and almost unanimously highlighted the positive effect of financial development on economic growth (King and Levine, 1993; Beck *et al.*, 2000; Arestis *et al.*, 2001). After the crisis, a new strand of studies (Caporale *et al.*, 2015; Fajeau, 2021) identified not only the absence of an association between the two phenomena but also highlighted that the incidence of financial crises is related to the dampening effect of financial deepening on growth (Rousseau and Wachtel, 2011).

More recently, the first evidence of a nonlinear relationship has emerged. Studies suggest that the effects of financial development on economic growth may depend on the level of development of economies (Arcand *et al.*, 2015), the occurrence of crises (Afonso and Blanco-Arana, 2022) or the structural characteristics of the economies analyzed (Swamy and Dharani, 2019; Tariq *et al.*, 2023; Asteriou *et al.*, 2024).

While previous research, such as that by Swamy and Dharani (2019) and Purewal and Haini (2022), has predominantly identified an inverted U-shaped relationship, especially in highly financially developed economies or earlier analyses of the European Union, the global role of the European financial system has notably diminished in recent years. Institutions that once dominated global financial rankings, including HSBC and BNP Paribas, have ceded leadership to American and Asian banks like JPMorgan Chase, the Industrial and Commercial Bank of China, and the Agricultural Bank of China. This shift signals a transformed global economic environment and underscores the need to reassess the link between financial development and economic growth within the contemporary European context. Thus, our study aims to fill this gap in the literature by empirically reassessing this relationship, focusing on its potential nonlinear form.

It is important to say that the **motivation** for this research comes from the ongoing academic and policy debate about the role of the financial system in promoting economic growth. This relationship remains ambiguous and context dependent in empirical literature. This long-standing debate has received renewed attention from European authorities, particularly through *the report published by Draghi (2024)*. The report reconfirms and strongly highlights the current limitations of the European financial system, pointing out persistent imbalances in terms of capital market depth, access to finance, and the efficiency of financial resource allocation. These factors continue to limit economic growth across the European Union. Also, the report calls for institutional and regulatory reforms aimed at

fostering financial integration, stimulating capital market development, and improving financial intermediation through diversified channels.

As a result, considering the renewed attention to the analysis of the relationship between financial development and economic growth, our study aims to provide updated empirical evidence, contributing to the academic literature and the current political debate prompted by the *the report published by Draghi (2024)*.

In this context, the research question that underpins this paper is: What would be the potential impact of financial intermediation development on economic growth in the European Union member states (EU28)?

The main objective of this study is to investigate the potential nexus between financial intermediation development and macroeconomic performance, with particular attention to the possible linear or nonlinear nature of this linkage. The empirical analysis is conducted using a panel dataset comprising the 28 EU member states over the period 2000–2021. This time interval was deliberately chosen, as it includes the years preceding the global financial crisis, the crisis period itself, and the post-crisis recovery, thus offering a comprehensive perspective on the evolution and dynamics of the association under examination.

The empirical investigation of this nexus, focused on the 28 member states of the European Union over the period from 2000 to 2021, seeks to offer a **twofold contribution**. On the one hand, it aims to extend the theoretical framework on the link between financial intermediation and economic growth by testing the hypothesis of non-linearity. On the other hand, beyond its academic contribution, it also provides empirical findings that can inform policy considerations. For instance, the finding that there is a detrimental impact at early stages but becomes beneficial once a critical institutional and functional maturity threshold is reached implies that policymakers could focus on strengthening the capacity of financial markets to mobilize the resources necessary for sustainable economic growth.

The **novelty of our study** is highlighted by multiple aspects. Primarily, it focuses on the nonlinear relationship between financial development and economic growth, examined in the context of the recent findings of *the report published by Draghi (2024)*. As mentioned above, the role of European financial systems has diminished in the past, thus necessitating a review of the relationship between financial development and economic growth in the current European economic context.

Furthermore, the **originality of our research** is reinforced by the comprehensive utilization of the multidimensional indicators from the International Monetary Fund's Financial Development Index database. Previous studies often employed only two well-known proxies of financial development: the credit to GDP ratio and the stock market capitalization to GDP ratio with the aim of emphasizing the financial development. However, financial systems have evolved into much more complex mechanisms that include the other dimensions of financial development (access and efficiency, besides depth), as well as other types of non-bank financial intermediaries (such as pension funds, mutual funds, insurance companies). To reflect this multi-dimensional and complex nature of financial development we used IMF's Financial Development Indexes. These indicators measure financial development in terms of depth, access, and efficiency at both institutional and market levels.

Unlike earlier studies, such as those by *Purewal and Haini (2022)* and *Asteriou et al. (2024)*, which relied on selected indicators, our study employs the complete set of available indices. As previously mentioned, financial systems have evolved into much more complex mechanisms. Consequently, the aggregate effect might mask significant heterogeneity across

different dimensions (depth, access, and efficiency) and components of financial systems (institutions or capital markets). To address this specific issue, we employ the full set of indexes, to identify which specific component of financial systems (market vs. institutions) and which facets (depth vs access vs efficiency) positively impact economic growth, and which might not have a direct impact or even a negative one. Rather than reaching a vague conclusion that more finance is better or worse for economic growth, we emphasized which aspects of financial development require attention from policymakers. Additionally, we introduce the **output gap** as an alternative proxy for economic growth alongside the conventional GDP growth rate, *offering novel insights into the cyclical dimension of the relationship*. Unlike the GDP growth rate, which measures gross output changes over time, the output gap reflects the deviation of actual GDP from potential GDP, thereby offering a cyclically adjusted view of how the economy is functioning (European Commission: Directorate-General for *et al.*, 2019). This study employs the output gap because of its essential role in identifying business cycle phases (expansions and recessions), which are relevant for understanding the relationship between financial development and economic performance at different cycle stages. It is worth noting that, to our knowledge, this variable has not yet been widely used in the context of exploring the nexus between financial development and economic growth. However, it has been employed as a proxy for economic growth in other studies (e.g., (Rzonca and Laszek, 2016; Ferreiro *et al.*, 2017)).

The application of the *bias-corrected least squares dummy variable (LSDVC) estimator* is novel in the context of analyzing the nexus between financial development and economic growth. Developed by Bruno (2005) based on earlier work of Kiviet (1995), the LSDVC estimator corrects the small-sample bias (Nickell bias) often found in classic LSDV estimates, especially when lagged dependent variables are present. Unlike GMM techniques such as Arellano-Bond or System GMM, which may become biased or inefficient in small-N panels (Hansen, 2001), the LSDVC estimator is a reliable alternative for moderately sized panels, as in our study. While there are studies that use this technique in different contexts (Salem *et al.*, 2025; Căpraru *et al.*, 2026), to the best of our knowledge, no studies have employed the LSDVC estimator to analyze the relationship between financial development and economic growth. Therefore, its novel application in our context not only addresses a key methodological challenge but also strengthens the robustness of our findings. It achieves this by providing more precise estimators with lower variance that are less prone to over instrumentation problems.

Through this approach, our study addresses an urgent research need and provides valuable insights that could inform the development of effective economic policies within the European Union.

To achieve the main objective of the research, *our paper is structured as follows*: introduction; the first section is dedicated to the analysis of specialized literature; Section 2 describes the data and variables, Section 3 the research methodology, while Section 4 highlights the empirical results obtained and the corresponding discussions. The general conclusions are presented in the final section.

2. LITERATURE REVIEW

A significant body of both qualitative and quantitative research has focused on identifying the causal relationship between financial development and economic growth.

Seminal studies (e.g., (Levine, 2005; Andrieș, 2009; Méon and Weill, 2010) highlight the theoretical underpinnings of financial intermediation, particularly the *theories of information asymmetry, agency theory, and the modern theory of financial intermediation*. These frameworks emphasize the essential role of financial institutions and markets in mobilizing funds, whether through deposit-taking or insurance issuance, and reallocating them to deficit agents in need of capital for productive activities. The development of financial intermediation is therefore seen as a catalyst for overall financial development, which in turn enhances macroeconomic performance, particularly through increased GDP growth.

Building on these theoretical foundations, researchers have argued that financial intermediaries exist primarily to mitigate information asymmetries and reduce transaction costs arising from technological disparities between surplus and deficit agents. This role is reinforced in the modern theory of financial intermediation, which outlines key channels through which intermediation contributes to productivity and growth: ex-ante evaluation of investments, corporate governance through monitoring, pooling of savings to reduce transaction and information costs, and facilitating the exchange of goods and services. These mechanisms support improved capital allocation, increased firm productivity, and macroeconomic expansion. Nonetheless, while theoretical models emphasize a predominantly positive impact of financial intermediation on economic growth, they tend to overlook potential negative effects or bidirectional causality. This aspect is more thoroughly explored by empirical quantitative studies, which reveal a range of nuanced and often conflicting findings.

Early empirical studies strongly supported this link, finding a robust positive correlation. King and Levine (1993) were the pioneers, demonstrating not only a positive and statistically significant impact on economic growth, but also on the accumulation of physical capital and the improvement of its efficiency. This fundamental finding was reinforced and expanded upon by Beck *et al.* (2000), who used two econometric instruments to demonstrate the existence of a positive relationship between financial development and economic growth.

Over two decades, numerous studies have replicated and refined this basic result. Pradhan *et al.* (2014), for example, examined the link between the development of capital markets, the banking system, economic growth, and four other macroeconomic variables of interest, as follows: foreign direct investment; trade openness, inflation rate, and final consumption expenditure of the government. The analysis focused on the Association of Southeast Asian Nations (ASEAN) and the period between 1961 and 2012. Among the general conclusions of the research was the finding that there is a causal relationship between the development of the banking sector, the development of capital markets, economic growth, and the four key macroeconomic variables. Another conclusion reflected in this study is highlighted by the fact that the development of the banking sector and capital markets, as well as other macroeconomic variables, have a positive long-term impact on economic growth.

These findings are also supported by more recent studies, such as Afonso and Blanco-Arana (2022), which review the relationship between financial development and economic growth, using the example of 31 OECD countries between 1990 and 2016. The authors' overall conclusion is that there is a positive impact of variables representing the financial system (such as domestic credit, stock market capitalization, and the turnover rate of traded shares) on the growth rate of GDP per capita.

Contrasting with this broad consensus, a smaller number of studies have questioned the universality or strength of this link. Caporale *et al.* (2015) analyzed the impact of financial development on economic growth in ten EU countries from the penultimate enlargement phases,

during the period 1994–2007, when these countries had underdeveloped financial markets, and thus their contribution to economic growth was minimal. Nevertheless, the authors also showed that a more efficient banking system could lead to accelerated economic growth, implying that a causal relationship could still exist. In a different approach, Fajeau (2021) found that the relationship between financial intermediation and economic growth may not necessarily depend on the level of financial development, but rather on the overall level of economic development. Asteriou *et al.* (2024) demonstrated that during periods free of fiscal stress or crisis, the relationship between financial development and economic growth becomes highly significant. However, in times of crisis, this relationship tends to lose significance.

In contrast, Rousseau and Wachtel (2011), using data for 84 countries over 1960–2004, show that excessive financial deepening and rampant credit growth can cause inflation and weaken the banking system. This can lead to financial crises and inhibit economic growth. This perspective is also supported by (Wen *et al.*, 2022). Their study highlights a positive link between financial development and either inflation or employment growth.

Additionally, there are studies (Méon and Weill, 2010; Breitenlechner *et al.*, 2015; Prochniak and Wasiak, 2017; Ito and Kawai, 2018; Asteriou and Spanos, 2019; An *et al.*, 2025), that demonstrate *both positive and negative effects*, depending on the specific context.

Another dimension of complexity concerns the direction of influence. Several researchers (Demetriades and Hussein, 1996; Greenwood and Smith, 1997; Hassan *et al.*, 2011; Pradhan *et al.*, 2014; Čižo *et al.*, 2020) have argued that causality does not operate in a single direction. For example, Demetriades and Hussein (1996), along with Greenwood and Smith (1997), concluded that there is a *bidirectional* causal link between the two phenomena. Similarly, Hassan *et al.* (2011) found evidence of a *unidirectional* relationship from economic growth to financial development in East Asia, the Pacific, and Sub-Saharan Africa, while a *bidirectional* relationship was observed in the remaining regions.

An extensive body of research (King and Levine, 1993; Beck *et al.*, 2000; Hassan *et al.*, 2011; Pradhan *et al.*, 2014; Caporale *et al.*, 2015; Asteriou and Spanos, 2019; Ferreira, 2020) has examined the relationship between financial development and economic growth from a **linear perspective**. In contrast, a number of more recent contributions have emphasized the potential **non-linear nature** of this relationship (Arcand *et al.*, 2015; Samargandi *et al.*, 2015; Prochniak and Wasiak, 2017; Benczúr *et al.*, 2019; Swamy and Dharani, 2019; Li and Wei, 2021; Afonso and Blanco-Arana, 2022; Purewal and Haini, 2022; Tariq *et al.*, 2023), suggesting that the effects of financial development on economic growth may vary depending on the level of financial development achieved or the structural characteristics of the economy in question.

Most studies that explore the non-linear dimension of this nexus support the existence of an *inverted U-shaped* curve (Arcand *et al.*, 2015; Swamy and Dharani, 2019), indicating that beyond a certain threshold, excessive financial development may become detrimental to economic growth. This perspective contrasts sharply with the current policy diagnosis of the European Union. In particular, *the report published by Draghi (2024)* states that the EU financial system is not overdeveloped, but fundamentally underdeveloped and fragmented, representing more of a brake on growth than a catalyst. The report, therefore, implies a U-shaped relationship. So, the benefits of financial development may only materialize after a certain level of financial maturity is reached.

The report's findings indicate that the European financial system is characterized by pronounced fragmentation, incomplete market integration, and limited capacity to efficiently mobilize capital. This is evident when compared to other major economies, such as the United

States and China. Draghi points out that, without significant structural reforms, financial development will be unable to sustainably support economic growth or facilitate green and digital transitions. He suggests deepening the Capital Markets Union by establishing common financial infrastructures, harmonizing regulatory frameworks, and reducing excessive reliance on bank-based financing.

Although the inverted U-shape is supported by broad cross-country studies, as mentioned above, the U-shaped hypothesis implied by *the report published by Draghi (2024)* remains an untested assumption in the context of EU member states. This gap in the empirical literature motivates our analysis.

3. METHODOLOGY

The present research is based on a panel dataset, targeting a sample of 28 European Union member countries. The United Kingdom is included in the sample because, for the majority of the analysis period, it was a full member of the European Union. Its inclusion enables a consistent analysis of the relationship between financial development and economic growth among countries subject to common EU-level regulations and economic policies. Excluding the UK solely due to its later withdrawal from the Union could distort the results, as the data corresponding to the period of its membership reflects economic and institutional conditions comparable to those of the other EU member states. The analysis covers 22 years, from 2000 to 2021. The statistical information used includes the GDP growth rate, which characterizes economic growth, a set of variables related to financial development, and a series of control variables. The data sources consist of the *World Bank's World Development Indicators (WDI)* and *Global Financial Development Indicators (GFDI)*, the *International Monetary Fund's Financial Development Index*, and the *AMECO database*.

The dependent variable in this study is the **GDP growth rate**, selected due to its widespread use as a key indicator of economic growth in the existing literature (Samargandi *et al.*, 2015; Swamy and Dharani, 2019; Wen *et al.*, 2022; Montañez-Enríquez *et al.*, 2024). Additionally, in the subsequent analysis conducted to test the robustness of the results, we will use the **output gap** as an alternative dependent variable to the GDP growth rate. This variable measures the difference between actual GDP and potential GDP as a percentage of potential GDP. Although the output gap is often used in the literature (Larch *et al.*, 2023; Căpraru *et al.*, 2025) for fiscal policy analysis, we employ it in this study due to its essential role in identifying business cycle phases (expansions and recessions), which are particularly relevant for understanding the dynamics between financial development and economic performance at different stages of the cycle. In this context, financial development may impact the output gap in the form of influencing the magnitude of the deviation between actual GDP from potential GDP, over different economic cycles. To illustrate this mechanism, consider the role of a higher degree of financial development in an economic expansion phase. Greater financial depth, for instance, which implies a greater degree of investment and consumption, could cause actual economic growth to exceed potential growth, thus increasing the positive output gap. In addition, to control the influence of fiscal policy, we include general government final expenditure as a control variable in the models.

Specifically referring to the variables used to describe financial development, their source is the International Monetary Fund (IMF) database. From the perspective of the indicators used to measure financial development, most empirical literature since the 1970s

has assessed financial development using two measures of financial depth: the share of private credit in GDP and the share of stock market capitalization in GDP. Several studies (Pradhan *et al.*, 2014; Prochniak and Wasiak, 2017; Benczúr *et al.*, 2019; Afonso and Blanco-Arana, 2022) use both indicators to show that financial development promotes economic growth. Comparatively, some authors (Fajeau, 2021; Wen *et al.*, 2022) use only one indicator, namely the private credit/GDP ratio. Other authors (Arcand *et al.*, 2015) use the share of credit in GDP to determine the existence of a threshold above which financial development no longer has a positive effect on economic growth.

However, these authors used variables that did not fully address the complex and multidimensional nature of the financial sector. The diversity of financial systems worldwide reflects the need for multiple indicators to assess financial development comprehensively. To overcome the limitations of single indicators, the IMF created the Financial Development Index database proposed by Svirydzienka (2016). These indices capture the development level of financial institutions and markets in terms of depth, access, and efficiency. These are then summarized in a global index of institutional and market development, culminating in an overall financial development index. Although some authors (Purewal and Haini, 2022; Asteriou *et al.*, 2024) have already attempted to analyze the link between financial development and economic growth using certain financial development indicators provided by the IMF, to the best of our knowledge, no study employed the full set of available indicators to assess the impact of financial development in terms of depth, access, and efficiency, across both financial institutions and financial markets.

Table no. 1 – Description of variables

Variable name	Description	Source
<i>Dependent variables</i>		
GDP growth rate (%)	Annual percentage growth rate of GDP at market prices based on constant local currency.	World Bank's World Development Indicators database
Output gap	Measured as the difference between actual GDP and potential GDP, expressed as a percentage of an economy's potential GDP.	AMECO database
<i>Financial Development Variables</i>		
Financial Institutions Depth Index	Reflects the depth of financial institutions, calculated based on indicators such as: credit to the private sector/GDP; pension fund assets/GDP; mutual fund assets/GDP; and insurance premiums (life and non-life)/GDP	International Monetary Fund's Financial Development Index database
Financial Institutions Access Index	Measures the degree of access to financial institutions, determined by indicators such as: the number of bank branches per 100,000 adults and ATMs per 100,000 adults	
Financial Institutions Efficiency Index	Reflects the efficiency of financial institutions, calculated using indicators such as: the net interest margin, loan-deposit spread, non-interest income/total income, operating costs/total assets, return on assets, and return on equity	
Financial Institutions Index	Includes the Financial Institutions Depth Index, Financial Institutions Access Index, and Financial Institutions Efficiency Index	

Variable name	Description	Source
Financial Markets Depth Index	Reflects the depth of financial markets and was calculated using indicators such as: stock market capitalization/GDP, shares traded/GDP, international government debt securities/GDP, total debt securities of financial companies/GDP, and total debt securities of non-financial corporations/GDP	
Financial Markets Access Index	Measures the degree of access to financial markets and was determined by indicators such as the percentage of market capitalization outside the top 10 largest companies and the total number of debt issuers (domestic and international, non-financial and financial).	
Financial Markets Efficiency Index	Reflects the efficiency of financial markets and was calculated using indicators such as the turnover rate on the stock market (shares traded/capitalization).	
Financial Markets Index	Includes the Financial Markets Depth Index, Financial Markets Access Index, and Financial Markets Efficiency Index.	
Financial Development Index	Includes both the Financial Institutions Index and the Financial Markets Index	
Control Variables		
Inflation Rate	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole.	
General Government Final Consumption Expenditure (% of GDP)	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	World Bank's World Development Indicators database
Unemployment	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.	

It is worth noting that economic growth is influenced not only by financial intermediation development but also by other factors. Therefore, in addition to the aforementioned determinants, the study also includes a set of control variables. From this perspective, we mention that a large number of specialized works (Beck *et al.*, 2000; Kuhry and Weill, 2010; Méon and Weill, 2010; Hassan *et al.*, 2011; Pradhan *et al.*, 2014; Arcand *et al.*, 2015; Creel *et al.*, 2015; Asteriou and Spanos, 2019; Raghutla and Chittedi, 2021; Afonso and Blanco-Arana, 2022) have used **inflation rate** as a determinant factor of economic growth.

Therefore, we assert that the majority of studies (Beck *et al.*, 2000; Kuhry and Weill, 2010; Méon and Weill, 2010; Hassan *et al.*, 2011; Pradhan *et al.*, 2014; Arcand *et al.*, 2015; Asteriou and Spanos, 2019; Asteriou *et al.*, 2024) have demonstrated a negative impact of inflation rate on economic growth, which, according to some authors (Kuhry and Weill, 2010), can be explained by the distortions induced by inflation, including the fact that high inflation limits available resources for profitable domestic investments. Despite this, there are also studies (Creel *et al.*, 2015; Raghutla and Chittedi, 2021; Afonso and Blanco-Arana, 2022) that have

obtained results contrary to this theory, in other words, they found a positive impact of inflation on economic growth. An explanation for this phenomenon may be as follows: when the economy is not operating at its full capacity, meaning when the unemployment rate is quite high, inflation may theoretically favor increased production, so more money would lead to higher spending, which in turn increases the demand for goods and services. Therefore, increased demand would lead to a higher supply, thus higher productivity. This nexus is observed only when the inflation rate is at reasonable levels, meaning it is not excessively high. It is worth noting that Afonso and Blanco-Arana (2022) have demonstrated a negative influence of inflation in OECD countries, while in the EU(21) during the period 1990–2016, the impact is positive. Therefore, the impact of the inflation rate on economic growth cannot be precisely predicted, but we consider there is a higher probability of obtaining a positive effect.

Other authors (Okun, 1962; Ferreira, 2020; Afonso and Blanco-Arana, 2022) use the **unemployment rate** as a factor influencing economic growth. In this regard, we emphasize that all studies reflect a negative impact of the unemployment rate on economic growth. It is worth mentioning that Okun's law (1962) states that a 1% increase in unemployment is usually associated with a 2% decrease in GDP, which can be explained by the fact that economic growth cannot be achieved with a shrinking active workforce, thus a reduced production capacity.

Beck *et al.* (2000) argue that **government spending** also influences GDP growth rates. The same conclusion is reflected in other empirical studies (Méon and Weill, 2010; Hassan *et al.*, 2011; Pradhan *et al.*, 2014; Breitenlechner *et al.*, 2015; Prochniak and Wasiak, 2017; Wen *et al.*, 2022), which have shown a negative impact of government spending on GDP growth. This phenomenon is argued by the fact that higher taxes, required to cover a larger volume of public spending, inhibit investment initiatives, as well as by the fact that the government excludes suppliers and is less efficient than they are.

For the aforementioned reasons, in addition to the variables characterizing financial development, as illustrated in Table no. 1, our analysis also includes the unemployment rate, the inflation rate, and government consumption expenditures relative to GDP as control variables. Table no. 2 presents the descriptive statistics of the variables and Table no. A2 shows the correlation matrix.

Within the literature examining the link between financial development and economic growth, a wide range of estimation techniques is employed, including Fixed Effects OLS, the Generalized Method of Moments (GMM), Panel VAR, Barro regressions, the Panel Smooth Transition Regression (PSTR) model, and Threshold regression models. It is worth noting that in our research, the models will be estimated using the **System GMM** method (Blundell and Bond, 1998), a choice justified both by existing literature and by the specific characteristics of the dataset analyzed.

The GMM method is frequently applied in empirical studies that investigate the link between financial development and economic growth (Beck and Levine, 2004; Ferreira, 2020; Cheng *et al.*, 2021; Fajeau, 2021; Wen *et al.*, 2022), due to its ability to effectively address common challenges in panel data analysis, such as endogeneity, unobserved heterogeneity, and serial correlation, which often affect econometric models based on panel structures.

Table no. 2 – Summary statistics for the period (2000–2021)

Variable	Obs	Mean	Std. dev	Min	Max
Dependent variables					
<i>GDP_growth</i>	588	0.025	0.040	-0.160	0.246
<i>Output_gap</i>	588	-0.005	0.036	-0.186	0.119
Independent variables					
<i>Fin_inst_dep</i>	588	0.494	0.258	0.042	1.000
<i>Fin_inst_acc</i>	588	0.647	0.218	0.062	1.000
<i>Fin_inst_eff</i>	588	0.575	0.076	0.300	0.830
<i>Fin_inst</i>	588	0.648	0.162	0.139	0.943
<i>Fin_market_dep</i>	588	0.433	0.312	0.011	0.989
<i>Fin_market_acc</i>	588	0.435	0.298	0.003	1.000
<i>Fin_market_eff</i>	588	0.463	0.394	0.000	1.000
<i>Fin_market</i>	588	0.449	0.265	0.018	0.950
<i>Fin_dev</i>	588	0.560	0.203	0.105	0.956
Control variables					
<i>Gen_gov</i>	588	0.199	0.029	0.117	0.278
<i>Unempl</i>	588	0.085	0.043	0.018	0.277
<i>Infl</i>	588	0.027	0.035	-0.099	0.432

Although the Difference GMM approach, initially proposed by [Arellano and Bond \(1991\)](#), represented a significant step forward in tackling these issues, it has certain limitations, particularly when dealing with variables that display high persistence over time or when working with panels that have a relatively small time dimension. In this context, the **System GMM** technique, later developed by [Blundell and Bond \(1998\)](#), offers additional advantages by simultaneously using the equations in levels and in first differences, thereby improving estimation efficiency and reducing specification bias.

Unlike classical methods such as fixed effects OLS regressions, which may yield biased estimates in the presence of explanatory variables correlated with the error term, the System GMM framework controls simultaneously for specification bias and variable persistence. Our application of System GMM does not explicitly instrument for reverse causality from growth to financial development. This modeling choice is directly influenced by prior causality analysis. Using the [Dumitrescu and Hurlin \(2012\)](#) test (results in [Table no. A1](#)), we find no evidence that economic growth drives financial development, while causality runs in the opposite direction.

Despite the various advantages System GMM holds over earlier GMM approaches, it remains seldom employed in the literature on the financial development -economic growth nexus, with a few recent exceptions ([Fajeau, 2021](#); [Asteriou et al., 2024](#)).

Therefore, the **baseline models** can be specified as follows:

$$Y_{it} = \beta_0 + \beta_1 * FIN_{DEV_{it}} + \beta_2 * X_{it} + \delta_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where: Y is a proxy for economic growth (gdp growth or output gap); FIN_DEV reflects a matrix of financial development variables which includes nine financial development indices from the IMF Financial Development Index database; $X_{i,t}$ is a vector of country-specific characteristics that are found in the empirical literature to influence GDP growth, i.e., lagged dependent variable, inflation, unemployment rate and government spending; i represents the cross-sectional units (1, 2, ..., 28 countries); t represents the year within the time period 2000-2021; δ_i reflects the use of country fixed effects; γ_t are time fixed effects to capture aggregate time shocks; and ε_{it} represents the error term.

To test potential non-linearity between financial development and economic growth, we estimate an augmented specification that includes both the linear and the squared term of the financial development indicator. The **model** takes the following form:

$$Y_{it} = \beta_0 + \beta_1 * FIN_{DEV_{it}}^2 + \beta_2 * FIN_{DEV_{it}} + \beta_3 * X_{it} + \delta_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where: Y is a proxy for economic growth (gdp growth or output gap); FIN_DEV^2 is the squared term of financial development, introduced to capture potential non-linearities; FIN_DEV reflects a matrix of financial development variables which includes nine financial development indices from the IMF Financial Development Index database; $X_{i,t}$ is a vector of country-specific characteristics that are found in the empirical literature to influence GDP growth, i.e., lagged dependent variable, inflation, unemployment rate and government spending; i represents the cross-sectional units (1, 2, ..., 28 countries); t represents the year within the time period 2000-2021; δ_i reflects the use of country fixed effects; γ_t are time fixed effects to capture aggregate time shocks; and ε_{it} represents the error term.

The model specifications were designed to minimize potential multicollinearity arising from the hierarchical structure of financial development indicators, which comprises multiple levels, including composite indices, sub-indices, and more disaggregated sub-subindices. Accordingly, indicators from different hierarchical tiers are not jointly included in the same regression specification.

To manage statistical multicollinearity among conceptually related variables at the same hierarchical level, we consulted the correlation matrix (results in Table no. A2). For example, it revealed a strong positive association between the Financial Market Depth Index and the Financial Institutions Depth Index. Consequently, only one of these two depth measures was included in our regression model.

To limit the influence of extreme values and ensure comparability across variables, a winsorization procedure at the 1st and 99th percentiles was applied. Additionally, to address potential heteroskedasticity and autocorrelation in the residuals, robust standard errors were employed for the System GMM estimations, while bootstrap standard errors were applied in the case of the LSDVC estimator.

4. RESULTS AND DISCUSSION

Baseline model results

The results of our regression analysis, presented in Table no. 4, provide robust evidence that financial development significantly influences economic growth in the EU. The impact is statistically significant for the vast majority of our financial development indicators, except for the overall financial markets index, the squared value of the financial markets development index, and the depth index of financial institutions.

Our main result indicates a **nonlinear, U-shaped** relationship between financial development and economic growth in the EU. While the baseline linear specification indicates a **negative** effect of the Composite Financial Development Index (see Table no. 3), this initial finding becomes clearer when non-linearity is considered: the *linear term remains negative* while the *squared term is positive* and highly significant.

This dual influence suggests a nonlinear, U-shaped association: financial development has a detrimental impact at early stages but becomes beneficial once a critical institutional and functional maturity threshold is reached. The effect of financial development on GDP growth varies with its level, being negative initially and positive after a certain maturity point is confirmed. At the current development level, EU28 financial systems are not mature enough to generate beneficial economic outcomes. However, as financial development progresses, it may become supportive of growth.

The negative influence of the linear term can be attributed to the negative influence exerted by both the financial institutions development index and the financial markets development index, both sub-components of the composite indicator. Our findings align with those of other studies that have identified a negative effect of financial development under certain conditions, including analyses using IMF-derived indicators (An *et al.*, 2025) and alternative measures of financial development (Méon and Weill, 2010; Rousseau and Wachtel, 2011; Arcand *et al.*, 2015; Breitenlechner *et al.*, 2015; Prochniak and Wasiak, 2017; Ito and Kawai, 2018; Asteriou and Spanos, 2019; Cheng *et al.*, 2021; Wen *et al.*, 2022; Tariq *et al.*, 2023).

We interpret this negative correlation of the linear term as evidence of insufficient and inefficient financial development within the EU. A fragmented financial sector may create systemic distortions that stifle rather than foster growth. Several observed features of European financial architecture support this view. For instance, high private saving with low productive investment has contributed to the region's current account surplus, excessive reliance on bank debt rather than equity finance hampers innovation, as banks are ill suited for supporting long term, risk taking investments, and a banking sector whose capacity is constrained by low profitability and high costs. These structural deficiencies, highlighted in analyses such as *the report published by Draghi (2024)*, suggest that without a more robust and diversified financial system, further development in its current form may continue to hinder economic growth.

Our findings are further confirmed by the analysis of the two main financial pillars: institutions and markets, reveals a clear asymmetry in their nonlinear effects on economic growth. The squared financial institutions development index has a positive and statistically significant effect on growth. In contrast, the squared financial markets index has a positive but not significant effect. Our results are in line with Asteriou *et al.* (2024), who find a nonlinear nexus for financial institutions but a linear one for capital markets. In the linear specifications for both financial institutions and markets (Table no. 3), their respective indices retain a negative effect on growth, indicating that early financial development may be harmful. For financial institutions, however, once maturity and efficiency are achieved, their influence becomes positive and significant.

The negative influence of financial markets is attenuated by a stronger, significant negative effect from financial institutions, underscoring the EU's bank-centric financial structure, where bank intermediation dominates over capital market development. When used separately, both financial institutions and financial markets development indicators also show significant negative impacts on growth. Our findings align with those of other studies (Botev *et al.*, 2019; Ferreira, 2020; Tariq *et al.*, 2023; An *et al.*, 2025).

Table no. 3 – Baseline Model Results

Dependent: GDP_ growth	I	II	(1) III	IV	V	VI	(2) VII	VIII
Fin_dev	-0.0205*** (0.0042)					-0.1155*** (0.0356)		
Fin_dev_squared						0.0883*** (0.0306)		
Fin_inst		-0.0228** (0.0092)	-0.0269*** (0.0064)				-0.1013** (0.0513)	
Fin_inst_squared							0.0639* (0.0382)	
Fin_market		-0.0038 (0.0053)		-0.0127*** (0.0033)				-0.0279** (0.0123)
Fin_market_squared								0.0180 (0.0139)
Fin_inst_acc					-0.0093* (0.0048)			
Fin_inst_dep					-0.0025 (0.0059)			
Fin_inst_eff					0.0574*** (0.0091)			
Fin_market_acc					0.0071* (0.0042)			
Fin_market_eff					-0.0148*** (0.0038)			
Infl	0.0018 (0.0264)	-0.0003 (0.0308)	-0.0002 (0.0331)	0.0206 (0.0280)	0.1621*** (0.0460)	-0.0248 (0.0424)	0.0701** (0.0289)	0.0055 (0.0323)
Gen_gov	-0.1605*** (0.0277)	-0.1402*** (0.0327)	-0.1391*** (0.0319)	-0.1870*** (0.0257)		-0.0794 (0.0495)	-0.1407** (0.0636)	-0.1782*** (0.0297)
Unempl	-0.0271 (0.0202)	-0.0296 (0.0224)	-0.0236 (0.0229)	-0.0238 (0.0197)		-0.0198 (0.0209)	-0.0267 (0.0310)	-0.0262 (0.0197)
Dependent (t-1)	0.4990*** (0.0707)	0.5248*** (0.1004)	0.5373*** (0.0791)	0.4731*** (0.0756)	0.2959*** (0.0963)	0.5813*** (0.0932)	0.4140*** (0.0940)	0.4930*** (0.0799)
Constant							0.0165 (0.0223)	
Observations	588	588	588	588	588	588	588	588
Countries	28	28	28	28	28	28	28	28
AR (1) test (p-value)	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000
AR (2) test (p-value)	0.080	0.086	0.094	0.077	0.086	0.111	0.058	0.077
Hansen J statistic (p-value)	0.640	0.325	0.253	0.822	0.753	0.103	0.572	0.671
Instruments	27	28	27	27	28	28	28	28
CountryFE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table presents the estimation results for the baseline models described in Equation (1) and Equation (2). Robust standard errors are reported in parentheses. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level.

Source: authors calculation

A granular examination of the sub-components reveals clear evidence of these structural weaknesses: the financial institutions' efficiency index and the financial markets' access index positively affect GDP growth, while the access and depth indices for institutions, and the efficiency index for markets, exhibit negative impacts. These negative effects reflect low structural development. Limited institutional depth and inefficient markets indicate an immature financial system that is unable to allocate resources to productive investments. This observation

is supported by the sub-indices' mean values (see [Table no. 2](#)), which lie below the mean measurement threshold, confirming insufficient financial development in the sample.

Notably, the lagged dependent variable (GDP growth at $t-1$) shows a consistently positive and statistically significant effect across all models, highlighting the models' dynamic nature and the persistence of growth over time. A result supported by other authors ([Fajeau, 2021](#); [Purewal and Haini, 2022](#); [Asteriou *et al.*, 2024](#)).

Regarding the control variables, our results suggest that inflation rate predominantly has a positive impact on economic growth, though the direction varies slightly between models, aligning with literature ([Creel *et al.*, 2015](#); [Raghutla and Chittedi, 2021](#); [Afonso and Blanco-Arana, 2022](#)). One possible explanation is that in economies operating below potential with relatively high unemployment, moderate inflation can stimulate aggregate output; increased money supply may boost consumption and investment, raising demand and output. However, this effect holds only at moderate inflation levels, as extreme inflation may be destabilizing. In our sample, inflation rates fall within reasonable ranges. For the control variable "unemployment rate", all regression models demonstrate a negative impact on GDP growth, consistent with Okun's (1962) law and subsequent studies ([Ferreira, 2020](#); [Afonso and Blanco-Arana, 2022](#)).

The ratio of government final consumption expenditure to GDP shows a significant negative impact (at the 1% level, with some exceptions) on economic growth across all models, in line with other studies ([Beck *et al.*, 2000](#); [Kuhry and Weill, 2010](#); [Méon and Weill, 2010](#); [Hassan *et al.*, 2011](#); [Pradhan *et al.*, 2014](#); [Breitenlechner *et al.*, 2015](#); [Prochniak and Wasiak, 2017](#); [Diaconășu *et al.*, 2019](#); [Čižo *et al.*, 2020](#); [Wen *et al.*, 2022](#); [An *et al.*, 2025](#)). This effect likely reflects how higher public spending, funded through taxes, can suppress private investment, and governments, being less efficient, may crowd out private providers.

The validity of the estimates is supported by diagnostic tests: the AR(2) test confirms absence of second-order autocorrelation, while the Hansen J test supports the validity of the instruments used, all p-values fall within acceptable econometric thresholds.

Robustness Tests

To test the robustness of the results obtained, we used the output gap as the dependent variable, serving as a proxy for economic growth. The results ([Table no. 4](#)) broadly validate our core conclusions but introduce important nuances regarding linear effects and market channels. According to the estimates, financial development continues to exert a negative effect on economic performance, consistent with previous findings obtained when the GDP growth rate was used as the dependent variable. However, a key difference emerges. The coefficient of the linear term is not statistically significant in this specification. This result suggests that at lower levels of financial development, its impact on the output gap is limited or ambiguous. In such contexts, the financial sector may still be underdeveloped, inefficient, or poorly regulated, which restricts its capacity to support effective resource allocation and stabilize economic fluctuations. As a result, financial development does not significantly contribute to closing the gap between actual and potential output, nor does it consistently prevent economic underperformance or overheating.

Nevertheless, our robustness results confirm a central similarity: the persistence of a nonlinear link. The squared term of the financial development index is positive and significant, while the linear relationship remains negative but statistically insignificant ([Table](#)

no. 4). These results are consistent with the conclusions drawn in the baseline analysis, supporting the existence of a U-shaped nonlinear correlation between financial development and economic growth.

Table no. 4 – Robustness Analysis Results: Different Dependent Variable

Dependent:			(1)					(2)
Output_gap	I	II	III	IV	V	VI	VII	VIII
Fin_dev	-0.0112 (0.0101)					-0.1060*** (0.0406)		
Fin_dev_squared						0.0891** (0.0451)		
Fin_inst		-0.0325*** (0.0085)	-0.0228*** (0.0085)				-0.1417*** (0.0352)	
Fin_inst_squared							0.1022*** (0.0339)	
Fin_markt		0.0099 (0.0077)		-0.0023 (0.0075)				-0.0248 (0.0256)
Fin_markt_squared								0.0257 (0.0350)
Fin_inst_acc					-0.0191*** (0.0069)			
Fin_inst_dep					-0.0009 (0.0073)			
Fin_inst_eff					-0.0639*** (0.0134)			
Fin_markt_acc					-0.0030 (0.0048)			
Fin_markt_eff					-0.0016 (0.0039)			
Infl	-0.0344 (0.0964)	-0.0128 (0.0953)	-0.0376 (0.0816)	-0.0143 (0.1028)	0.0349 (0.0886)	-0.0236 (0.0993)	0.0132 (0.0893)	-0.0190 (0.1026)
Gen_gov	-0.0700 (0.0541)	-0.1528*** (0.0472)	-0.1526*** (0.0436)	-0.2121*** (0.0455)		-0.1110* (0.0633)	-0.0579 (0.0525)	-0.1975*** (0.0545)
Unempl	-0.0578 (0.0428)	-0.0577 (0.0415)	-0.0632* (0.0376)	-0.0524 (0.0385)		-0.0532 (0.0440)	-0.0320 (0.0383)	-0.0556 (0.0438)
Dependent (t-1)	0.9268*** (0.0051)	0.9285*** (0.0046)	0.9281*** (0.0047)	0.9260*** (0.0051)	0.9355*** (0.0033)	0.9279*** (0.0046)	0.9291*** (0.0040)	0.9268*** (0.0050)
Observations	587	587	587	587	587	587	587	587
Countries	28	28	28	28	28	28	28	28
AR (1) test (p-value)	0.314	0.314	0.314	0.314	0.313	0.314	0.314	0.314
AR (2) test (p-value)	0.324	0.324	0.324	0.324	0.325	0.324	0.324	0.324
Hansen J statistic(p-value)	0.269	0.272	0.271	0.270	0.270	0.264	0.271	0.262
Instruments	26	27	26	26	28	27	27	27
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table presents the estimation results for the robustness checks using an alternative dependent variable in Equation (1) and Equation (2). Robust standard errors are reported in parentheses. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level.

Source: authors calculation

A further difference highlighted by the robustness check concerns the role of financial markets. While the core findings are confirmed, the indicators reflecting financial market development lose their statistical significance in explaining the output gap. This lack of significance might be explained by the fact that the financial markets in the EU28 countries analyzed are underdeveloped or fragmented, such that their effects on cyclical performance (as measured by the output gap) may be weak or delayed. This fact reduces the effectiveness of market signal transmission mechanisms to the real economy and diminishes the potential impact of these markets on the deviation of output from its potential level (output gap). Moreover, as mentioned by [Furlanetto et al. \(2021\)](#), financial frictions, such as transaction costs, asymmetric information, and credit constraints, limit the ability of monetary policy to fully stabilize the output gap, making some fluctuations unavoidable and causing the effects of financial development on cyclical economic performance to manifest weakly or with delay.

Thus, the lack of statistical significance for the financial markets development index, compared to the significance of the financial institutions development index, reflects a structural imbalance (also confirmed by the baseline model analysis) between the two financial intermediation channels, exacerbated by market fragmentation and excessive reliance on the banking sector.

To further assess the robustness of our results, we employed a different estimation technique: the Bias-Corrected Least Squares Dummy Variable (LSDVC) estimator for dynamic panel models. We made this choice due to concerns about potential over instrumentation in GMM estimates, even when the number of instruments is formally within acceptable limits. Over instrumentation can lead to efficiency losses and biased estimators. Thus, applying the LSDVC method provides an additional robustness check.

The results obtained from applying LSDVC confirm the robustness of the results obtained in the baseline analysis. In addition, they confirm the consistency of the GMM system estimates, using a method that is less sensitive to specification and instrumentation issues, which increases confidence in the robustness and credibility of our conclusions.

[Table no. 5](#) presents the robustness check results obtained using the Bias-Corrected Least Squares Dummy Variable (LSDVC) estimator, initialized via System GMM. The findings confirm the previously identified patterns, notably the persistent and statistically significant negative impact of financial development on economic performance. The key similarities are confirmed: the linear component of the financial development index continues to point to a negative effect, while the squared term indicates a positive effect. Therefore, the U-shaped relationship is robustly validated.

Our results reconfirm the conclusion from the main analysis that the current level of financial development remains insufficient to effectively support economic growth. Despite this fact, the growing significance of the squared term suggests that once a higher level of development is reached, financial systems may act as growth catalysts. Still, the variables capturing financial market development remain statistically insignificant under LSDVC, reinforcing the idea that, unlike financial institutions, financial markets are not yet functioning as effective channels for fostering economic growth in the EU context.

**Table no. 5 – Robustness Analysis Results: Alternative Estimation Instrument
("Bias-corrected LSDV Dynamic Panel Data Estimator")**

Dependent: GDP_growth	(1)			(2)				
	I	II	III	IV	V	VI	VII	VIII
Fin_dev	-0.0451** (0.0186)					-0.1653*** (0.0596)		
Fin_dev_squared						0.1138** (0.0563)		
Fin_inst		-0.0546*** (0.0164)	-0.0527*** (0.0167)				-0.1704** (0.0690)	
Fin_inst_squared							0.0967* (0.0561)	
Fin_market		-0.0020 (0.0124)		0.0022 (0.0127)				0.0113 (0.0412)
Fin_market_squared								-0.0105 (0.0452)
Fin_inst_acc					-0.0330*** (0.0097)			
Fin_inst_dep					-0.0160 (0.0174)			
Fin_inst_eff					0.0362** (0.0178)			
Fin_market_acc					0.0021 (0.0102)			
Fin_market_eff					0.0032 (0.0078)			
Infl	0.1615*** (0.0566)	0.1552*** (0.0576)	0.1538*** (0.0578)	0.1696*** (0.0556)	0.1424*** (0.0523)	0.1528*** (0.0556)	0.1428** (0.0564)	0.1675*** (0.0568)
Gen_gov	-0.4004*** (0.1076)	-0.3893*** (0.1087)	-0.3880*** (0.1090)	-0.4149*** (0.1083)		-0.4210*** (0.1065)	-0.4192*** (0.1103)	-0.4150*** (0.1090)
Unempl	-0.0106 (0.0357)	-0.0410 (0.0399)	-0.0416 (0.0398)	0.0072 (0.0347)		-0.0228 (0.0356)	-0.0470 (0.0389)	0.0071 (0.0349)
Dependent (t-1)	0.3216*** (0.0366)	0.3069*** (0.0359)	0.3075*** (0.0358)	0.3281*** (0.0370)	0.3454*** (0.0364)	0.3200*** (0.0373)	0.3092*** (0.0368)	0.3286*** (0.0366)
Countries	28	28	28	28	28	28	28	28
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

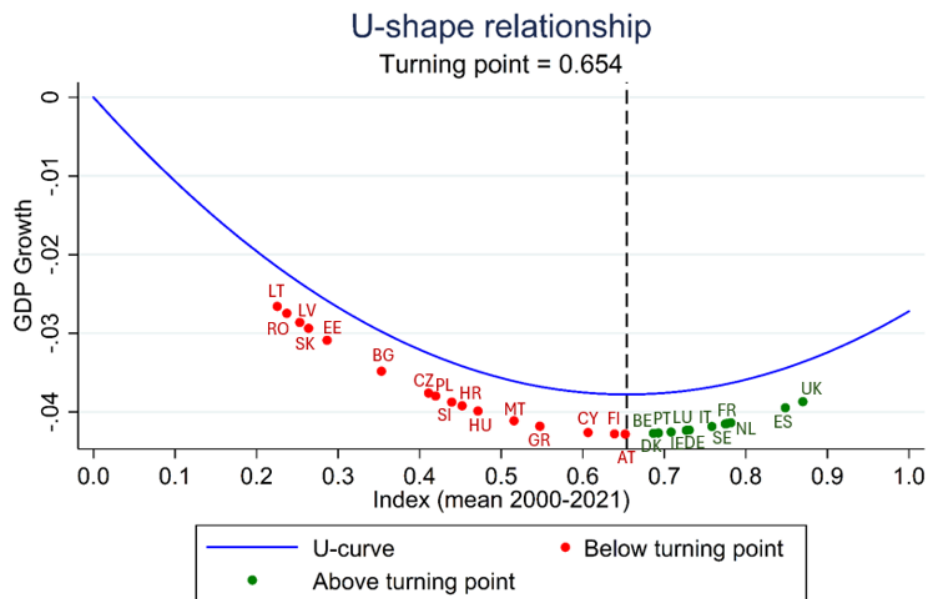
Note: This table presents the results of the robustness checks obtained by using an alternative estimator ("Bias-corrected LSDV dynamic panel data estimator") for the estimation of Equations (1) and (2). Bootstrap errors are reported in parentheses. *** Statistically significant at the 1% level. ** Statistically significant at the 5% level. * Statistically significant at the 10% level.

Source: authors calculation

Turning Point Analysis

To further investigate the U-shaped relationship between financial development and economic growth, we calculate the turning point based on the estimated coefficients from the baseline model. The turning point is estimated at 0.654, falling within the normalized range of the financial development index [0, 1]. Notably, this value exceeds the sample mean of the financial development index (0.560) reported in Table no. 2, suggesting that the majority of EU countries have not yet reached the threshold beyond which financial development begins to generate beneficial economic outcomes, thus confirming the general conclusion that financial systems in most EU economies are not yet sufficiently mature.

Figure no. 1 illustrates the U-shaped relationship and the position of each EU country relative to the turning point. The results reveal that 16 out of 28 countries analyzed have not yet reached the turning point, being located on the negative side of the curve. These include predominantly new EU member states that joined the Union in 2004 or after, such as Lithuania, Romania, Latvia, Slovakia, Estonia, Bulgaria, Czechia, Poland, Slovenia, Croatia, Hungary, Malta, and Cyprus, but also several older member states, namely Greece, Finland, and Austria. For these economies, the current level of financial development still exerts a negative effect on economic growth, suggesting that financial systems in these countries may not yet be sufficiently mature to generate beneficial economic outcomes. Notably, on the downward slope of the curve, the dispersion across countries is more pronounced, with countries spread across a wide range of index values, reflecting considerable heterogeneity in the level of financial development among economies that have not yet reached the turning point.



Note: Predicted values are calculated based on the estimated coefficients from the baseline model, holding all control variables constant at their sample means for the 2000-2021 period. Red points represent countries positioned below the turning point (downward slope); green points represent countries that have surpassed the turning point (upward slope). Country abbreviations: AT (Austria), BE (Belgium), BG (Bulgaria), CY (Cyprus), CZ (Czechia), DE (Germany), DK (Denmark), EE (Estonia), ES (Spain), FI (Finland), FR (France), GR (Greece), HR (Croatia), HU (Hungary), IE (Ireland), IT (Italy), LT (Lithuania), LU (Luxembourg), LV (Latvia), MT (Malta), NL (Netherlands), PL (Poland), PT (Portugal), RO (Romania), SE (Sweden), SI (Slovenia), SK (Slovakia), UK (United Kingdom).

Source: Authors' own estimations

Figure no. 1 – U-shaped relationship and position of EU countries relative to the turning point of the financial development-growth nexus (2000-2021)

In contrast, 12 countries have surpassed the turning point and are positioned on the positive side of the curve, where further financial development contributes positively to

economic growth, including Germany, France, the Netherlands, Belgium, Denmark, Sweden, Luxembourg, Ireland, Portugal, Italy, Spain, and the United Kingdom. These are exclusively older EU member states, suggesting that more established economies tend to exhibit higher levels of financial development. On the upward slope, the vast majority of countries are clustered in close proximity to the threshold, with the notable exceptions of Spain and the United Kingdom, which exhibit considerably higher levels of financial development. This suggests that even for many economies on the upward slope, the transition toward achieving substantial positive effects from financial development is still in its early stages.

Overall, the turning point analysis reveals that the majority of EU countries have not yet reached the threshold level of financial development required to generate positive effects on economic growth.

5. CONCLUSION

Our research shows that most independent variables reflecting financial development have a statistically significant impact on GDP growth. Despite this fact, the financial market index, the squared financial market development index, and the financial institutions' depth index are exceptions. Our results highlight the impact of financial development on economic growth and underscore the relevance of this relationship in the EU context. The general financial development index shows **a negative impact on GDP growth, indicating an inverse relationship**. This may be due to the insufficient level of financial development among EU member states, where a weak and fragmented financial sector hinders growth rather than promoting it. Our interpretation of an underdeveloped system aligns with the structural diagnosis of European financial deficiencies presented in policy documents, such as *the report published by Draghi (2024)*.

A key insight from our analysis is the presence of a **U-shaped nonlinear link** between financial development and economic growth. The linear component of the financial development index has a significant negative effect, while the squared term has a significant positive effect, suggesting that financial development initially hinders growth but becomes a catalyst once a critical level of institutional and functional maturity is reached. Our robustness analysis confirms this pattern, thus financial institutions exert a stronger impact on growth than financial markets, reflecting the institutional channel's central role in financial intermediation in the EU.

The results of our paper can serve as a **solid starting point for designing policies** aimed at effectively stimulating financial development, while also strengthening the capacity of financial markets and institutions to mobilize resources in support of sustainable economic growth. For instance, the estimated U-shaped relationship indicates that the growth effects of financial development depend on its level. This suggests that EU-level reforms aimed at advancing financial development may yield growth benefits primarily once higher levels of financial development are attained.

Furthermore, looking more closely at the underlying mechanisms, the analysis highlights several operational priorities. While the efficiency of financial institutions (captured by indicators such as net interest margins, operating costs, and return on assets) has a positive impact on growth, the measures of financial institutions depth, such as private credit and pension fund assets relative to GDP, show no comparable effect.

This finding offers a clear policy message: EU financial reforms should move away from simply expanding bank balance sheets and instead focus on improving efficiency within the sector. Such reforms include fostering greater competition to reduce interest margins and spreads, lowering operational costs in banking, and enhancing profitability through better risk-adjusted returns.

Additionally, the finding that nonlinear, threshold effects are strong for institutions but weak for markets reinforces the idea of a strategic sequence for integration. Completing the Banking Union through a common deposit insurance scheme and harmonized supervision is a direct institutional reform that can improve efficiency and stability. This reform should be prioritized over pushing for deep capital market integration in an environment that is still fragmented and may lack the foundational depth and efficiency of markets.

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References

- Afonso, A., & Blanco-Arana, M. C. (2022). Financial and economic development in the context of the global 2008-09 financial crisis. *International Economics*, 169, 30–42. <http://dx.doi.org/10.1016/j.inteco.2021.11.006>
- An, T. H. T., Chen, S. H., & Yeh, K. C. (2025). Does financial development enhance the growth effect of FDI? A multidimensional analysis in emerging and developing Asia. *International Journal of Emerging Markets*, 20(1), 92–134. <http://dx.doi.org/10.1108/IJOEM-03-2022-0495>
- Andrieș, A. M. (2009). Theories regarding financial intermediation and financial intermediaries—a survey. 9(2), 254–261.
- Arcand, J. L., Berkes, E., & Panizza, U. (2015). Too much finance? *Journal of Economic Growth*, 20(2), 105–148. <http://dx.doi.org/10.1007/s10887-015-9115-2>
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297. <http://dx.doi.org/10.2307/2297968>
- Arestis, P., Demetriades, P. O., & Luintel, K. B. (2001). Financial development and economic growth: The role of stock markets. *Journal of Money, Credit and Banking*, 33(1), 16–41. <http://dx.doi.org/10.2307/2673870>
- Asteriou, D., & Spanos, K. (2019). The relationship between financial development and economic growth during the recent crisis: Evidence from the EU. *Finance Research Letters*, 28, 238–245. <http://dx.doi.org/10.1016/j.frl.2018.05.011>
- Asteriou, D., Spanos, K., & Trachanas, E. (2024). Financial development, economic growth and the role of fiscal policy during normal and stress times: Evidence for 26 EU countries. *International Journal of Finance & Economics*, 29(2), 2495–2514. <http://dx.doi.org/10.1002/ijfe.2793>
- Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, 28(3), 423–442. [http://dx.doi.org/10.1016/S0378-4266\(02\)00408-9](http://dx.doi.org/10.1016/S0378-4266(02)00408-9)
- Beck, T., Levine, R., & Loayza, N. (2000). Finance and the Sources of Growth. *Journal of Financial Economics*, 58(1-2), 261–300. [http://dx.doi.org/10.1016/S0304-405X\(00\)00072-6](http://dx.doi.org/10.1016/S0304-405X(00)00072-6)
- Benczur, P., Karagiannis, S., & Kvedaras, V. (2019). Finance and economic growth: Financing structure and non-linear impact. *Journal of Macroeconomics*, 62. <http://dx.doi.org/10.1016/j.jmacro.2018.08.001>

- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [http://dx.doi.org/10.1016/S0304-4076\(98\)00009-8](http://dx.doi.org/10.1016/S0304-4076(98)00009-8)
- Botev, J., Égert, B., & Jawadi, F. (2019). The nonlinear relationship between economic growth and financial development: Evidence from developing, emerging and advanced economies. *Inter Economics*, 160, 3–13. <http://dx.doi.org/10.1016/j.inteco.2019.06.004>
- Breitenlechner, M., Gächter, M., & Sindermann, F. (2015). The finance–growth nexus in crisis. *Economics Letters*, 132, 31–33. <http://dx.doi.org/10.1016/j.econlet.2015.04.014>
- Bruno, G. S. (2005). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics Letters*, 87(3), 361–366. <http://dx.doi.org/10.1016/j.econlet.2005.01.005>
- Caporale, G. M., Rault, C., Sova, A. D., & Sova, R. (2015). Financial development and economic growth: Evidence from 10 new European Union members. *International Journal of Finance & Economics*, 20(1), 48–60. <http://dx.doi.org/10.1002/ijfe.1498>
- Căpraru, B., Georgescu, G., & Sprincean, N. (2026). Fiscal Rules, Independent Fiscal Institutions and Sovereign Risk: Evidence From the European Union. *International Journal of Finance & Economics*, 31(1), 29–45. <http://dx.doi.org/10.1002/ijfe.3127>
- Căpraru, B., Pappas, A., & Sprincean, N. (2025). Fiscal rules in the European Union: Less is more. *Journal of Common Market Studies*, 63(1), 320–334. <http://dx.doi.org/10.1111/jcms.13628>
- Cheng, C. Y., Chien, M. S., & Lee, C. C. (2021). ICT diffusion, financial development, and economic growth: An international cross-country analysis. *Economic Modelling*, 94, 662–671. <http://dx.doi.org/10.1016/j.econmod.2020.02.008>
- Čižo, E., Lavrinenko, O., & Ignatjeva, S. (2020). Analysis of the relationship between financial development and economic growth in the EU countries. *Insights into Regional Development*, 2(3), 645–660. [http://dx.doi.org/10.9770/ird.2020.2.3\(3\)](http://dx.doi.org/10.9770/ird.2020.2.3(3))
- Creel, J., Hubert, P., & Labondance, F. (2015). Financial stability and economic performance. *Economic Modelling*, 48, 25–40. <http://dx.doi.org/10.1016/j.econmod.2014.10.025>
- Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics*, 51(2), 387–411. [http://dx.doi.org/10.1016/S0304-3878\(96\)00421-X](http://dx.doi.org/10.1016/S0304-3878(96)00421-X)
- Diaconășu, D. E., Pohoată, I., & Socoliuc, O. R. (2019). Keynes versus Laffer or Misleading Perspectives against Normal Evolution. *Romanian Journal of Economic Forecasting*, 22(3).
- Draghi, M. (2024). *The future of European competitiveness: A competitiveness strategy for Europe*. Retrieved from https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en
- Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4), 1450–1460. <http://dx.doi.org/10.1016/j.econmod.2012.02.014>
- European Commission: Directorate-General for, E., Financial, A., Hristov, A., Mc Morrow, K., Roeger, W., & Vandermeulen, V. (2019). *Output gaps and cyclical indicators*: Publications Office. <http://dx.doi.org/10.2765/79777>
- Fajeau, M. (2021). Too much finance or too many weak instruments? *International Economics*, 165, 14–36. <http://dx.doi.org/10.1016/j.inteco.2020.10.003>
- Ferreira, C. (2020). *Financial development and macroeconomic performance: A cointegration approach* (2020/0155). Retrieved from https://rem.rc.iseg.ulisboa.pt/wps/pdf/REM_WP_0155_2020.pdf
- Ferreiro, J., Gálvez, C., Gómez, C., & González, A. (2017). Economic crisis and convergence in the Eurozone countries. *Panoeconomicus*, 64(2), 223–244. <http://dx.doi.org/10.2298/PAN1702223F>
- Furlanetto, F., Gelain, P., & Taheri Sanjani, M. (2021). Output gap, monetary policy trade-offs, and financial frictions. *Review of Economic Dynamics*, 41, 52–70. <http://dx.doi.org/10.1016/j.red.2020.07.004>
- Greenwood, J., & Smith, B. D. (1997). Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics & Control*, 21(1), 145–181. [http://dx.doi.org/10.1016/0165-1889\(95\)00928-0](http://dx.doi.org/10.1016/0165-1889(95)00928-0)

- Hansen, G. (2001). A bias-corrected least squares estimator of dynamic panel models. *AStA. Advances in Statistical Analysis*, 2(85), 127–140.
- Hassan, M. K., Sanchez, B., & Yu, J. S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of Economics and Finance*, 51(1), 88–104. <http://dx.doi.org/10.1016/j.qref.2010.09.001>
- Ito, H., & Kawai, M. (2018). Quantity and Quality Measures of Financial Development: Implications for Macroeconomic Performance. *Public Policy Review*, 14, 803–834.
- King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3), 717–737. <http://dx.doi.org/10.2307/2118406>
- Kiviet, J. F. (1995). On bias, inconsistency, and efficiency of various estimators in dynamic panel data models. *Journal of Econometrics*, 68(1), 53–78. [http://dx.doi.org/https://doi.org/10.1016/0304-4076\(94\)01643-E](http://dx.doi.org/https://doi.org/10.1016/0304-4076(94)01643-E)
- Kuhry, Y., & Weill, L. (2010). Financial intermediation and macroeconomic efficiency. *Applied Financial Economics*, 20(15), 1185–1193. <http://dx.doi.org/10.1080/09603101003800792>
- Larch, M., Malzubris, J., & Santacroce, S. (2023). Numerical compliance with EU fiscal rules: Facts and figures from a new database. *Inter Economics*, 58(1), 32–42. <http://dx.doi.org/10.2478/ie-2023-0008>
- Levine, R. (2005). Chapter 12 Finance and Growth: Theory and Evidence. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 1, pp. 865–934): Elsevier. [http://dx.doi.org/10.1016/S1574-0684\(05\)01012-9](http://dx.doi.org/10.1016/S1574-0684(05)01012-9)
- Li, G., & Wei, W. (2021). Financial development, openness, innovation, carbon emissions, and economic growth in China. *Energy Economics*, 97. <http://dx.doi.org/10.1016/j.eneco.2021.105194>
- Méon, P. G., & Weill, L. (2010). Does financial intermediation matter for macroeconomic performance? *Economic Modelling*, 27(1), 296–303. <http://dx.doi.org/10.1016/j.econmod.2009.09.009>
- Montañez-Enríquez, R., Ossandon Busch, M., & Ramos-Francia, M. (2024). Untangling the finance-growth nexus: The dual role of financial development in the transmission of shocks. *Emerging Markets Review*, 63. <http://dx.doi.org/10.1016/j.ememar.2024.101192>
- Okun, A. M. (1962). *Potential GNP: Its measurement and significance*. Paper presented at the Proceedings of the Business and Economic Statistics Section of the American Statistical Association.
- Pradhan, R. P., Arvin, M. B., Hall, J. H., & Bahmani, S. (2014). Causal nexus between economic growth, banking sector development, stock market development, and other macroeconomic variables: The case of ASEAN countries. *Review of Financial Economics*, 23(4), 155–173. <http://dx.doi.org/10.1016/j.rfe.2014.07.002>
- Prochniak, M., & Wasiak, K. (2017). The impact of the financial system on economic growth in the context of the global crisis: Empirical evidence for the EU and OECD countries. *Empirica*, 44, 295–337. <http://dx.doi.org/10.1007/s10663-016-9323-9>
- Purewal, K., & Haini, H. (2022). Re-examining the effect of financial markets and institutions on economic growth: Evidence from the OECD countries. *Economic Change and Restructuring*, 55(1), 311–333. <http://dx.doi.org/10.1007/s10644-020-09316-2>
- Raghutla, C., & Chittedi, K. R. (2021). Financial development, real sector and economic growth: Evidence from emerging market economies. *International Journal of Finance & Economics*, 26(4), 6156–6167. <http://dx.doi.org/10.1002/ijfe.2114>
- Rousseau, P. L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry*, 49(1), 276–288. <http://dx.doi.org/10.1111/j.1465-7295.2009.00197.x>
- Rzonca, A., & Laszek, A. (2016). *On Economic Growth in Europe, or, the Uncertain Growth Prospects of Western Countries*. Retrieved from
- Salem, M. R. M., Shahimi, S., Alma'amun, S., Hafizh Mohd Azam, A., & Ghazali, M. F. (2025). ESG and Banking Performance in ASEAN-5: Disaggregated Analysis Using System GMM and LSDVC. *SAGE Open*, 15(4). <http://dx.doi.org/10.1177/21582440251382564>

- Samargandi, N., Fidrmuc, J., & Ghosh, S. (2015). Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle-income countries. *World Development*, 68, 66–81. <http://dx.doi.org/10.1016/j.worlddev.2014.11.010>
- Svirydzhenka, K. (2016). *Introducing a New Broad-based Index of Financial Development* (9781513583709 1018-5941). Retrieved from Washington, DC:
- Swamy, V., & Dharani, M. (2019). The dynamics of finance-growth nexus in advanced economies. *International Review of Economics & Finance*, 64, 122–146. <http://dx.doi.org/10.1016/j.iref.2019.06.001>
- Tariq, R., Rahman, A., & Khan, M. A. (2023). Does Human Capital Reinvigorate the Relationship Between Financial Development and Economic Growth: Evidence from Pakistan. 30(2), 110–119. <http://dx.doi.org/10.22004/AG.ECON.344189>
- Wen, J., Mahmood, H., Khalid, S., & Zakaria, M. (2022). The impact of financial development on economic indicators: a dynamic panel data analysis. *Economic Research-Ekonomska Istraživanja*, 35(1), 2930–2942. <http://dx.doi.org/10.1080/1331677X.2021.1985570>

ANNEX

Table no. A1 – Results of Dumitrescu and Hurlin (2012) Panel Granger Causality Test

Null Hypothesis	W-Stat	Zbar (tilde)	Prob (p-value)
Economic growth does not Granger-cause financial development	1.19	0.21	0.830
Financial development does not Granger-cause economic growth	2.20	3.20	0.001

Table no. A2 – Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)Fin_dev	1.000											
(2)Fin_inst	0.887*	1.000										
(3)Fin_markt	0.960*	0.723*	1.000									
(4)Fin_inst_acc	0.453*	0.680*	0.265*	1.000								
(5)Fin_inst_dep	0.856*	0.825*	0.782*	0.164*	1.000							
(6)Fin_inst_eff	0.212*	0.237*	0.174*	-0.094*	0.243*	1.000						
(7)Fin_markt_acc	0.607*	0.500*	0.606*	0.310*	0.477*	-0.091*	1.000					
(8)Fin_markt_dep	0.942*	0.805*	0.923*	0.318*	0.843*	0.237*	0.476*	1.000				
(9)Fin_markt_eff	0.686*	0.393*	0.789*	0.028	0.499*	0.215*	0.078*	0.652*	1.000			
(10)Infl	-0.369*	-0.344*	-0.341*	-0.203*	-0.345*	0.029	-0.229*	-0.331*	-0.237*	1.000		
(11)Gen_gov	0.312*	0.221*	0.332*	-0.193*	0.428*	0.290*	-0.104*	0.377*	0.426*	-0.260*	1.000	
(12)Unempl	-0.179*	-0.226*	-0.133*	0.046	-0.295*	-0.350*	-0.145*	-0.127*	-0.051	-0.208*	0.023	1.000

Note: The table presents the correlation matrix of the winsorized independent variables. * indicates statistical significance at the 10% level.