



Financial Structure, Investment and Growth of the EU Non-Financial Sector

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Abstract This paper tests the neutrality view for the Non-Financial Corporations (NFC) sector in the European Union (EU) between 2000 and 2021. We investigate how market-based and bank-based finance can affect Investment and Value-Added performance within this sector. We use a Panel VAR specification to account for the time profile in the response of performance indicators. Our evidence indicates that market-based finance stimulates Value-Added and investment growth in the EU's advanced economies, mainly in Intellectual Property Products. In Eastern and South-Eastern member states, investment growth, especially in tangible goods, is stimulated by bank finance. In this group, market-based finance plays an important role for intangible investment. Three main implications emerge. First, the neutrality view does not hold; second, the economic and financial systems of the various EU countries are characterized by deep differences; third, implementing the Capital Market Union alongside the Banking Union will remain a key priority in the EU.

Keywords: European Union, Financial Structure, Non-financial Corporations, Gross Value Added, Growth, Investment

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I. Introduction

Over the last four decades, the European Union (EU) has consistently recorded lower productive investment-to-GDP ratios than other advanced economic areas, such as the United

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States and China (see Buti et al., 2025). At the aggregate level, this persistent pattern has been accompanied by economic growth primarily driven by positive and rising net exports, which have corresponded to an excess of aggregate savings towards aggregate investment. At the microeconomic level, insufficient investment has limited structural changes in the EU's traditional specialization: a strong manufacturing sector dominated by small and medium-sized firms with solid but mature technologies, alongside overly traditional services. The persistence of this outdated economic model has reinforced the EU's lag behind the international technological frontier, now dominated by digital and artificial intelligence activities. As a result, the EU economy has become locked into a follower role in an international market increasingly shaped by bilateral and technological conflicts and deepening geopolitical instability. This role is incompatible with the medium- to long-term sustainability of the EU's economic and social model, which rests on effective yet costly market regulation and a strong welfare state.

To address these challenges, the EU allocated substantial central financial resources—both grants and loans—through the Next Generation EU initiative, specifically the Recovery and Resilience Facility (RRF). The latter program was designed to support national reforms and investment to implement green and digital transitions and safeguard social inclusion, thereby enhancing competitiveness and fostering sustainable growth. However, with less than one year remaining before the conclusion of the RRF, the EU economy is stagnating and has failed to narrow its gap towards the global technological frontier. Two recent high-profile European reports (Letta, 2024; Draghi, 2024) argue that reversing the EU's negative inertia requires transforming the one-off central fiscal capacity activated by the RRF into a larger, permanent instrument. Moreover, both Draghi and Letta stress the importance of additional and innovative private investment. In this regard, they recommend advancing the integration of European financial markets by completing the Banking Union and operationalizing the Capital Markets Union.¹⁾

The current fragmentation at the national level of the EU's financial markets creates barriers that disincentivize the mobilization of the financial resources held by investors and firms for the support of innovative activities.²⁾ These activities are quite risky and require specific types of market-based finance more than banking loans or the issuance of standard corporate bonds. Hence, the current prudential composition of the financial portfolios, held by EU's households, can become compatible with the financing of EU's innovative activities only if there are specialized intermediaries (professional and institutional) ready to transform traditional allocations in tools suited to efficiently finance incubators, start-ups, and innovators as well as more traditional

1) Today, the focus on private investment is crucial also due to the low appetite for a centralization of the fiscal capacity that is shown by the EU's institutions and several national governments in the area. To make this statement intuitive, let us just stress that a permanent fiscal capacity at the European level would require transfers of national sovereignty in favor of the EU.

2) The ECB's Financial Integration Report (ECB, 2024) shows that not only there is a persistent national fragmentation in European financial markets, but also that this fragmentation specifically applies to the banking sector.

firms (specifically, small- and medium-sized firms) that should relax their dependence on banks' loans.³⁾ Intermediaries in the European fragmented financial markets are often too weak to perform these roles fully. A necessary—though perhaps not sufficient—condition to strengthen their initiatives is therefore the establishment of unified financial markets.

The aim of our paper is threefold: (i) to show that the above statement does not uniformly apply to all national economic systems in the EU, implying that unified financial markets at the European level should be made compatible with specialized zones and different types of intermediaries; (ii) to provide evidence that it would be possible to trigger a gradual process going in the desired direction; and (iii) to point out that different types of investment (tangible, intangible, Intellectual Property Products - IPP, and R&D) are crucial ingredients for the implementation of this process. Points (i) and (ii) imply that enhancing efficiency in the European banking sector and non-banking intermediaries is important. Achieving this result would facilitate reaching a suitable mix of bank-based and market-based financial resources at different stages of the process, thereby accommodating the specific and evolving needs of EU countries characterized by heterogeneous levels of development. According to the theory of evolving financial systems (Boot and Thakor, 1997; Demirgüç-Kunt et al., 2013), bank-based finance may be more appropriate for the prevailing traditional activities located in the new EU member states—such as the Eastern European countries, while market-based finance is particularly relevant for long-standing EU members and for the innovative activities in the new EU member states.

The paper provides evidence that financial structure matters for the EU's economic activity. Our first step is to discuss the main contributions of the literature on the relationship between financial structures and economic growth (Section 2). Then, given that a formal test based on a macro-panel allows us to reject the so-called 'neutrality view,' we describe the methodological approach and the data used to provide descriptive empirical evidence that financial structures significantly impact the economic performance of the EU's Non Financial Corporations (NFC) sector (Section 3). Section 4 discusses the econometric results, while Section 5 concludes the paper.

To highlight our contribution, it is helpful to be more precise regarding the long-standing theoretical and empirical debate on the 'neutrality view' (Beck and Levine, 2002; Levine, 2005; Gambacorta et al., 2014; Nuño and Thomas, 2017; Bats and Houben, 2020; Duarte et al., 2022). This view maintains that financial structure does not affect the dynamics of real activity. We formally test this claim using a macro-panel covering the NFC sector of 24 EU member states over the 2000-2021 period. We estimate the impact of market-based and bank-based finance on the growth of Gross Value Added (GVA) and NFC investment, distinguishing between

3) Even though in the fifteen years preceding the pandemic shock the Euro Area (EA) has doubled the incidence of non-banking loans and corporate bonds on total financing, banks still play a dominant role in many EA countries (see Schnabel, 2021; Messori, 2019).

tangible and intangible investments. We also account for country heterogeneity by splitting the EU sample according to the seniority of EU membership.

Our test rejects the hypothesis that financial structure does not matter for the EU's real activity. This allows us to analyze the specific impacts of different financial structures. Our analysis uses a Panel VAR approach based on GMM regressions. This approach is beneficial for controlling for possible endogeneity in the relationship between financial structure and the economic performance of NFCs due to reverse causality and omitted factors affecting both variables. Moreover, it enables us to identify the time dynamics of the performance variables' responses to shocks in the financial structure index. To explore the various channels through which financial structures can affect NFCs' economic performance, we consider different measures: NFC Gross Value Added, NFC tangible investment, and NFC intangible investment, further divided into Intellectual Property Products (IPP) and R&D.

The general results of our econometric analysis carry important policy implications. They confirm the widespread view that core EA countries and the most innovative part of the other member states would benefit from transitioning to a market-based system. However, these results also highlight that the prevailing traditional activities in other countries—specifically, those that joined the EU or EA immediately before or after the global financial crisis—are still at a lower stage of financial development, so banks remain more efficient than market-based relations. Higher transaction costs can theoretically explain this evidence due to information asymmetries or other imperfections. The policy implication is clear: strengthening banks and financial markets is necessary to ensure that different funding sources are available to different firms and minimize their vulnerability to disruptions in banking or capital markets.

These results demonstrate that our paper innovates along three dimensions. First, our econometric analysis provides updated evidence on the role of market-based and bank-based finance in the economic performance of EU countries during 2000-2021. Previous studies covered shorter periods; they did not examine the post-global financial crisis phase and did not specifically focus on the EU. Second, we account for the asymmetries characterizing the economic development of different member states, distinguishing between older and newer members and, when required (see below), between traditional and innovative activities. This highlights the heterogeneous effects of the two sources of finance across groups, which is in line with the theory of evolving financial systems. Third, we examine the heterogeneity in investment responses to changes in bank-based and market-based finance according to their innovative content. Finally, we provide aggregate evidence that complements recent micro-level studies (Yano and Shiraishi, 2020; Demmou and Franco, 2021; Didier and Cusolito, 2024) on equity finance versus debt finance in stimulating innovative investment.

II. Survey of Literature

The 'neutrality view' maintains that no specific financial structure dominates others in supporting economic activity and stimulating performance. To challenge this view, and to reiterate the idea that stock markets, bond markets, banks, and other non-market instruments provide distinct forms of financing that have a significant impact on production processes, researchers have examined whether a bank-oriented or market-oriented financial system promotes different outcomes in the NFC sector and, if so, under what conditions.

Over the decades, the literature has identified both advantages and disadvantages of market-based and bank-based systems, stressing their importance for growth. Some theoretical contributions argue that, compared to market-based instruments, banks are better equipped to address agency problems (see, among others, Stiglitz, 1985; Boyd and Smith, 1998; Levine, 2005). However, the strong cyclical volatility of bank credit can foster bubbles during expansionary phases and exacerbate credit crunches and financial crises during recessions (Adrian and Shin, 2014; Nuño and Thomas, 2017). By contrast, financial assets issued on capital markets or supplied through private transactions can yield superior performance when sufficient public information about firms' overall riskiness and creditworthiness exists. In such cases, standardized pricing mechanisms can function effectively (Acemoglu and Zilibotti, 1999; De Fiore and Uhlig, 2011). The theory of evolving financial systems provides a unifying interpretation of these contributions, which posits that different financial structures may be efficient at different stages of economic development (see, for instance, Boot and Thakor, 1997). From this perspective, the dominance of bank-based or market-based systems depends on the evolution and organization of economic activity.

Empirical studies further emphasize these dynamics. Some contributions suggest that market-oriented systems perform better during downturns and recovery periods (Gambacorta et al., 2014), since excessive bank credit volatility amplifies the business cycle and makes R&D investment highly procyclical (Aghion et al., 2012). Moreover, bank-oriented systems may impede growth by embedding systemic risks positively correlated with uncertainty and instability, reducing investment and consumption (Reinhart and Rogoff, 2011; Langfield and Pagano, 2015; Bats and Houben, 2020). Recent research also indicates that market-based finance fosters economic growth by enhancing the beneficial effects of financial development (Duarte et al., 2022). The overarching implication of these theoretical and empirical contributions, which systematically examine the relationship between financial development and real economies, is the rejection of the neutrality view (see, among others, Levine and Zervos, 1998; Rajan and Zingales, 1998; Beck and Levine, 2002; Levine, 2002).

Recent firm-level analysis complements these findings by examining the role of different financial sources for corporate investment across asset types. Using a large sample of equities

and bonds issued by firms in 65 countries, Didier et al. (2021) show that firms raising capital on financial markets—rather than relying exclusively on credit markets—experienced stronger sales growth, increased labor demand, got greater production potential, and had a higher accumulation of both tangible and intangible assets. These effects were even stronger for financially constrained firms like small, young, and high-R&D companies. Furthermore, equity issuance (though not bond issuance) appears to be strongly and positively associated with intangible investment by high-R&D firms (Yano and Shiraishi, 2020; Demmou and Franco, 2021; Didier and Cusolito, 2024; EIB, 2025). Segol et al. (2021) examine the effect of bank loan conditions on NFCs' intangible investment and find that restrictive loan terms have more detrimental effects than quantity rationing.

Other recent contributions highlight the heterogeneity of investment responses. Bauer et al. (2024) use firm-level data to study investment resilience during the crisis and find substantial heterogeneity across asset types: specific intangible categories, such as R&D and organizational capital, displayed lower elasticity to income shocks; on the other hand, machinery and equipment, and software showed higher elasticity. Besides, they document that tighter financial constraints during the pandemic had more substantial adverse effects on tangible than intangible investment. Using German firm-level data, Kochen (2024) investigates whether equity finance can substitute for credit during a banking crisis and finds a partial substitution effect. This study underscores the role of multiple financing sources as backup facilities.

It is important to emphasize that the simplified description of correlations between a country's or firm's financial organization and its performance cannot be interpreted as evidence of causality in either direction. Nevertheless, econometric exercises allow for stronger interpretations. In any case, it is worth noting that the links between financing sources and firms' performances have attracted increasing attention during the global financial crisis, the sovereign debt crisis, and the pandemic crisis. Over the past two decades, monetary authorities have actively stressed the importance of financial structures, advocating initiatives such as the Banking Union and the Capital Markets Union. The related literature reflects a similar concern.

Altavilla et al. (2019) show that, between 2008 and 2019, a contraction in loan supply encouraged firms to substitute bank loans with bonds, resulting in a significant increase in debt security issuances. This trend also led to higher bond spreads, though the overall credit substitution with bonds remained moderate. Holm-Hadulla et al. (2022) similarly report that, following the global financial crisis and the pandemic, European NFCs increased their reliance on bond issuances, motivated by supply-side constraints in the former case, and by low interest rates in the latter. In recent years, Andersson et al. (2021) found that higher bond issuances partially offset adverse credit conditions. Darmouni and Papoutsi (2022) document that the composition of bond issuers shifted toward smaller and riskier firms, and that issuances were associated with higher investment, sales, and assets. Iannamorelli et al. (2024) show that small

and medium enterprises with stronger financial and organizational fundamentals were more likely to access bond markets, improving their credit conditions.

In summary, the recent literature provides consistent evidence against the neutrality of financial sources, particularly when distinguishing across financial asset types. While many studies rely on micro-level data to capture firms' heterogeneity, this paper follows a macro-level approach focused on NFCs. This strategy offers several advantages: it avoids firm-level selection biases that tend to exclude smaller firms, ensures greater comparability across countries through harmonized data, and enables assessment of whether micro-level results extend to the aggregate level. We rely on a Panel VAR model estimated using GMM techniques. This approach allows us to address endogeneity arising from omitted variable bias, thereby providing more reliable causal inference when valid instruments are available compared to other estimation techniques.

III. Data and Methodology

A. The dataset

We use annual data relating to individual EU countries to investigate the relationship between the sources of finance and the investment or growth dynamics. These data stem from different sources. The complete list and definitions are shown in Table 1. As performance indicators, we use Gross Value Added and investment (Gross Fixed Capital Formation) of NFCs expressed in constant prices and obtained from the Eurostat Annual Sector Accounts. We also look at the performance of different types of investment assets: tangible, intangible, intellectual property products, and R&D. Data on gross capital formation by asset type are drawn from the EUKLEMS and INTANProd database (Bontadini et al., 2023), and the latter database provides information for several sectors. The NFC sector includes agriculture, mining, industry, construction, and services, but not finance and real estate. Data for NFCs' sources of finance are based on the Eurostat Annual Sector Accounts database. Market-based finance is the sum of listed shares, other equities, and debt securities. Bank-based finance is given by the stock of loans from MFIs to NFCs.⁴⁾ The residual source of external finance includes non-bank loans and unlisted shares.

We collect data from 2000 to 2021, because EUKLEM-INTANProd data are unavailable after 2021. The sample includes all EU countries with the obvious exception of the UK. Bulgaria, Croatia, and Poland do not report data on Tangible Investment.

4) MFIs group central banks, resident credit institutions as defined in Community Law, and other resident financial institutions whose business is to obtain deposits or close substitutes for deposits from entities other than MFIs and to grant different forms of credit. MFIs can also include money market funds; hence, bank-based instruments can be extended to some of the assets of money funds.

Table 1. *Data Description*

Variable	Full name	Source
Gross Value Added	Gross Value Added of NFCs in constant euros.	Eurostat Annual Sector Accounts (key indicators <i>nasa_10_ki</i>)
Investment	Gross Fixed Capital Formation on NFCs in constant euros.	Eurostat Annual Sector Accounts (key indicators <i>nasa_10_ki</i>)
Tangible investment	Gross Investment in Tangible goods of NFCs in constant euros. NFCs are represented by the market economy, excluding financial and insurance activities.	EUKLEMS and INTANProd
Intangible investment	Gross Investment in Intangible goods of NFCs in constant euros. NFCs are represented by the market economy, excluding financial and insurance activities.	EUKLEMS and INTANProd
IPP investment	Gross investment in Intellectual Property Products of NFCs in constant euros. NFCs are represented by the market economy, excluding financial and insurance activities.	EUKLEMS and INTANProd
RD investment	Gross investment in Research and Development of NFCs in constant euro. NFCs are represented by the market economy, excluding financial and insurance activities.	EUKLEMS and INTANProd
Market based-finance	Stock of listed Shares+Other equity+debt securities of NFCs.	Eurostat Annual Sector Accounts (financial balance sheets <i>nasa_10_f_bs</i>)
Bank-based finance	MFI loans to NFCs in euros.	ECB Statistical Data Warehouse (Adjusted loans vis-a-vis euro area NFCs reported by MFIs excl. ESCB)
Shares	Stock of listed Shares+Other Equity of NFCs in euros.	Eurostat Annual Sector Accounts (financial balance sheets <i>nasa_10_f_bs</i>)
Bonds	Stock of debt securities of NFCs in euros.	Eurostat Annual Sector Accounts (financial balance sheets <i>nasa_10_f_bs</i>)
Other finance	Stock of Non-Bank Loans+Unlisted Shares in euros.	Eurostat Annual Sector Accounts (financial balance sheets <i>nasa_10_f_bs</i>)

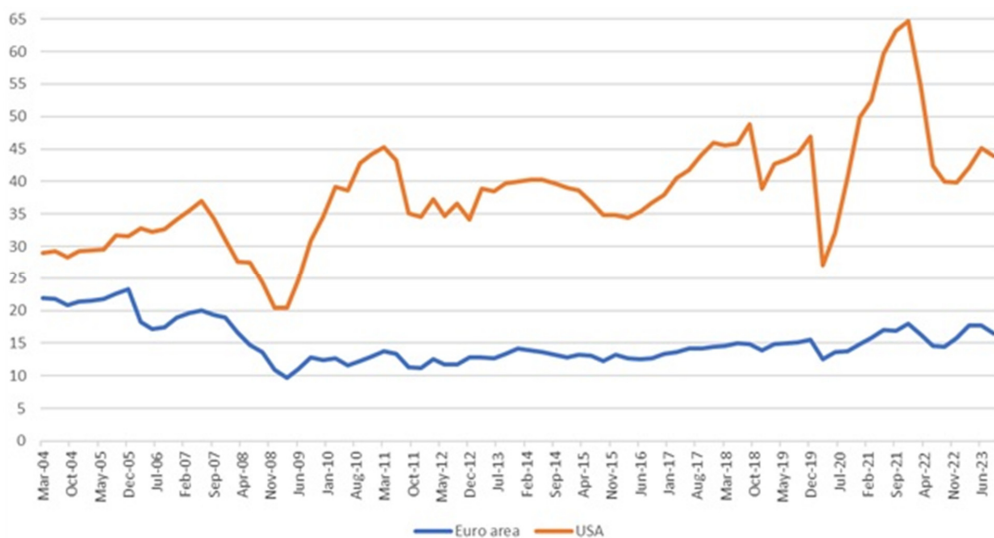
The sample is divided into two groups. The first group includes the countries that became EU members between 1999 and 2004 (the so-called old member states: OMS). Fourteen countries are part of this group: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and Sweden. The second group includes countries that joined the EU in 2004 and 2007 (the so-called new member states: NMS). Nine countries are part of this second group: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia, and Slovakia. The two groups of countries, defined by the political criterion of entry into the EU, coincide with the two groups, which are characterized by different economic and financial evolution stages. The OMS group includes advanced economies with developed financial systems, while the NMS includes emerging countries with less developed financial systems. These differences are confirmed by the ranking of countries based on several indicators of financial organization. In the Online appendix, Table A4 specifies these rankings according to different indices: the IMF-Financial Markets Development index, the IMF-Financial

Development index, and the AFME (2024) Global Integration, Competitiveness, and Risk Capital indexes. These competitiveness indexes would divide the EU member states into the two groups we already selected using the political criterion. There would be slight differences if we referred to a Global Integration Index (see AFME, 2024a). Still, moderate but larger differences would be found if we utilized a Risk Capital Index (see AFME, 2024b).

B. Preliminary descriptive evidence

The Euro area's (EA) NFC sector has historically exhibited substantially lower reliance on market-based finance than bank-based finance, especially compared to the US. Figure 1 illustrates the differences between the two areas by showing the evolution of the market-to-bank finance ratio for the two regions over the last 20 years. The EA began with a slightly above 20% ratio, which then declined steadily until the global financial crisis. Afterward, the ratio stabilized at a level slightly below 15%, before increasing by a few percentage points during the pandemic. By contrast, the US has consistently shown much higher and more volatile levels of this ratio. Before the global financial crisis, the US recorded a positive gap of about 10-15 percentage points relative to the EA. This gap widened to 20-25 percentage points in the following years, reaching a peak of 40 percentage points during the pandemic due to the surge in the use of market-based instruments in the US and further developments in the stock exchange. Since 2022, however, the gap has narrowed to around 20 percentage points, reflecting a substantial reduction in the US ratio.

Figure 1. Market to bank ratio the Euro area and the US



(Source) Federal Reserve Economic Data

Table 2 provides evidence on GVA, investment, and sources of finance for the two subsamples of EU countries, relative to total financial liabilities (TFL), for the period 2000-2021. The NMS group records higher levels of investment and GVA growth and higher investment intensity than the OMS group. This result is consistent with the status of the latter's emerging economies. At the same time, NMS countries also display faster growth in all sources of external finance, although their absolute levels remain substantially below those observed in OMS. Exceptions include Cyprus, Croatia, Estonia, and Poland, which report relatively high levels of market-based finance, and Denmark and Sweden, which exhibit very low levels of bank finance.

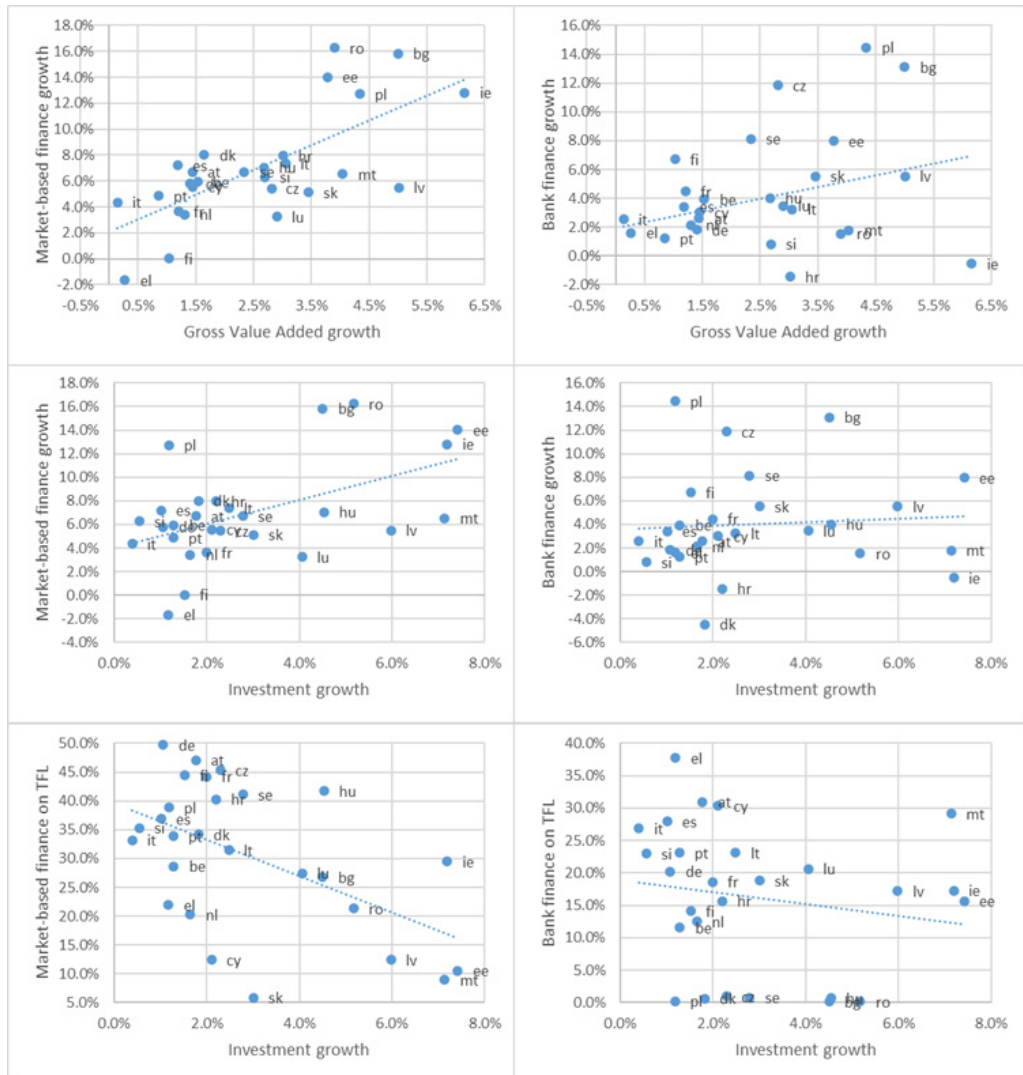
Table 2. *Investment, Growth, Market-based, and Bank-based Finance*

country	Inv growth	GVA growth	Inv/ GVA	Market growth	Bank growth	Market/ TFL	Bank/ TFL	Market/ GVA	Bank/ GVA
Bulgaria	4.5%	5.0%	31.6%	15.8%	13.1%	26.7%	0.1%	102.3%	0.5%
Cyprus	2.1%	1.4%	17.1%	5.6%	3.0%	12.4%	30.4%	94.3%	242.0%
Czechia	2.3%	2.8%	28.6%	5.4%	11.9%	45.3%	1.0%	139.4%	2.8%
Estonia	7.4%	3.8%	29.0%	14.0%	8.0%	10.5%	15.7%	36.1%	55.1%
Croatia	2.2%	3.0%	30.0%	8.0%	-1.5%	40.3%	15.7%	143.3%	57.8%
Hungary	4.5%	2.7%	27.3%	7.1%	4.0%	41.7%	0.7%	144.0%	2.4%
Latvia	6.0%	5.0%	21.4%	5.5%	5.5%	12.4%	17.2%	26.0%	37.2%
Lithuania	2.5%	3.1%	27.8%	7.4%	3.2%	31.5%	23.1%	74.5%	55.5%
Malta	7.1%	4.0%	20.4%	6.5%	1.8%	8.9%	29.2%	31.3%	109.4%
Poland	1.2%	4.3%	23.6%	12.7%	14.5%	38.9%	0.2%	104.9%	0.6%
Romania	5.2%	3.9%	30.1%	16.3%	1.5%	21.3%	0.1%	44.8%	0.3%
Slovenia	0.6%	2.7%	25.8%	6.3%	0.8%	35.3%	23.0%	105.0%	72.3%
Slovakia	3.0%	3.5%	30.1%	5.1%	5.5%	5.9%	18.8%	14.1%	44.4%
Average NMS	3.7%	3.5%	26.4%	8.9%	5.5%	25.5%	13.5%	81.5%	52.3%
Austria	1.8%	1.4%	26.3%	6.7%	2.6%	47.1%	31.0%	141.7%	93.1%
Belgium	1.3%	1.5%	25.0%	5.9%	3.9%	28.6%	11.6%	150.8%	60.7%
Germany	1.1%	1.4%	20.2%	5.8%	1.8%	49.7%	20.2%	149.4%	60.1%
Denmark	1.8%	1.6%	23.0%	8.0%	-4.5%	34.1%	0.7%	175.5%	3.5%
Greece	1.2%	0.3%	19.9%	-1.7%	1.6%	22.0%	37.8%	81.1%	141.0%
Spain	1.0%	1.2%	25.5%	7.2%	3.4%	36.9%	28.0%	156.4%	118.0%
Finland	1.5%	1.0%	22.7%	0.0%	6.7%	44.4%	14.1%	183.6%	58.4%
France	2.0%	1.2%	20.7%	3.6%	4.5%	44.2%	18.6%	197.0%	82.4%
Ireland	7.2%	6.2%	27.8%	12.8%	-0.5%	29.4%	17.3%	191.4%	85.6%
Italy	0.4%	0.1%	23.0%	4.4%	2.6%	33.2%	26.9%	134.2%	107.9%
Luxembourg	4.1%	2.9%	21.2%	3.2%	3.5%	27.5%	20.6%	374.0%	287.9%
The Netherlands	1.6%	1.3%	17.2%	3.4%	2.1%	20.3%	12.5%	128.3%	77.3%
Portugal	1.3%	0.9%	25.2%	4.9%	1.2%	33.9%	23.1%	169.6%	115.5%
Sweden	2.8%	2.3%	25.1%	6.7%	8.1%	41.1%	0.8%	233.3%	4.3%
Average OMS	2.1%	1.7%	23.1%	5.1%	2.6%	35.2%	18.8%	176.1%	92.6%

(Source) Our elaborations for the period 2000-2021, based on Eurostat and ECB Statistical Data warehouse. TFL=total financial liabilities

Figure 2 shows the relationship between the overall investment and GVA performance and the two sources of finance. The growth rate of bank- and market-based finance is positively related to GVA. Investment growth is positively related to market-based finance growth, whereas the relationship with bank-based finance is less clear.

Figure 2. Bivariate relationship between investment/GVA growth and market-/bank-based finance

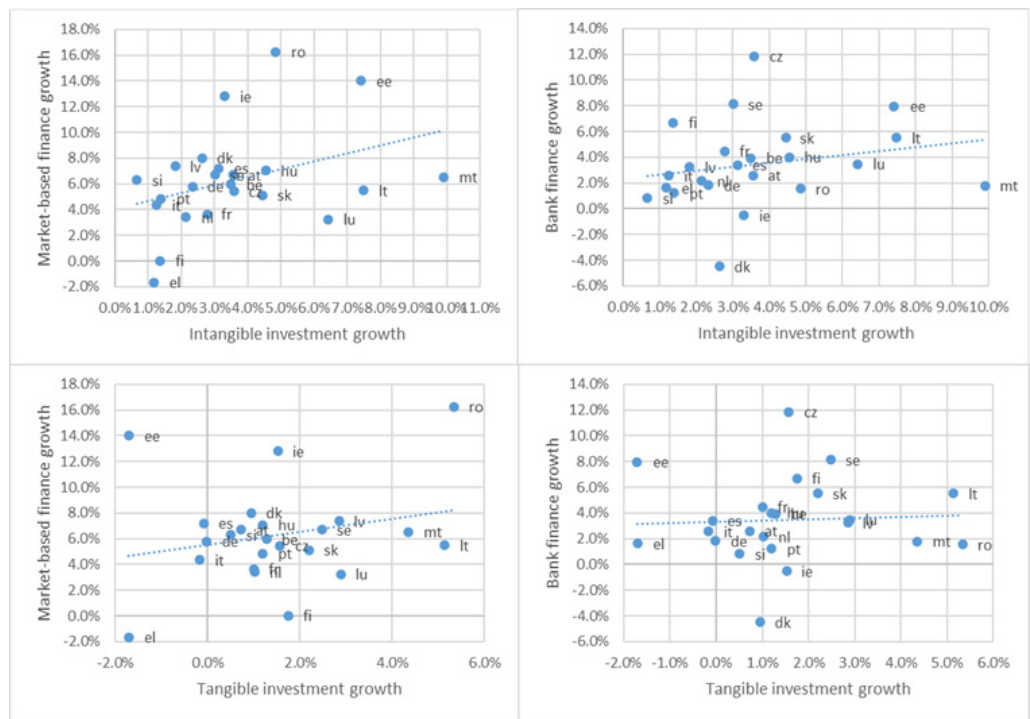


(Source) Our elaborations, based on Eurostat and ECB Statistical Data warehouse

Figure 3 illustrates the relationship between tangible and intangible investment growth and market- and bank-based finance growth. All fitted lines are positively sloped, but the steepest

is the tangible investment growth towards market-based finance growth. The slopes referring to bank-based finance are less pronounced; particularly, the relationship between bank finance and tangible investment appears almost flat.

Figure 3. Bivariate relationship between tangibles/intangibles investment growth and market-/bank-based finance



(Source) Our elaborations, based on Eurostat, EUKLEMS-INTAProd, and ECB Statistical Data warehouse

To provide complementary evidence, Table 3 reports partial correlations between performance indicators and sources of finance. For the EU, market-based finance significantly correlates with overall investment growth and intangible investment. In the OMS group, market-based finance is significantly related to all types of investment, except R&D, while bank-based finance is significantly related only to R&D investment. In the NMS group, bank-based finance is positively and significantly related to GVA growth and tangible and intangible investment, while market-based finance is positively related only to R&D investment.

This descriptive evidence highlights three points. First, OMS and NMS fit with a political classification and distinct stages of growth and financial development. Second, both sources of finance appear to be positively related to investment performance, although the relationship is stronger for market-based finance. Third, the relationship between investment growth and market-based finance is stronger in OMS, while bank-based finance is significantly related to

investment in NMS. Taken together, these three points provide an initial answer to our main research questions: apparently, the neutrality view does not hold, as bank- and market-based finance are differently related to investment and GVA growth; moreover, the differences between OMS and NMS are consistent with the theory of evolving financial systems. However, these conclusions warrant further econometric investigation.

Table 3. *Partial Within-Group Correlations*

	Total EU		
	Market-based	Bank-based	Other
GVA growth	0.023	0.023	0.112***
Investment growth	0.034*	0.050	0.248***
Tangible investment growth	0.090	0.119	0.264
Intangible investment growth	0.042**	0.037	0.163***
IPP investment growth	0.068**	0.033	0.082
RD investment growth	0.128*	0.115*	0.207*
	EU OMS		
	Market-based	Bank-based	Other
GVA growth	0.033	0.006	0.232***
Investment growth	0.088***	0.023	0.644***
Tangible investment growth	0.168*	-0.019	1.170**
Intangible investment growth	0.070*	0.020	0.437***
IPP investment growth	0.076**	-0.009	0.453***
RD investment growth	0.180	0.131*	0.617***
	EU NMS		
	Market-based	Bank-based	Other
GVA growth	0.022	0.061*	0.069***
Investment growth	0.022	0.101***	0.102**
Tangible investment growth	0.108	0.239*	-0.085
Intangible investment growth	0.043	0.064**	0.052**
IPP investment growth	0.089	0.109	-0.066
RD investment growth	0.110*	-0.020	0.035

*significant at 10% level; **significant at 5% level; ***significant at 1% level.

C. Econometric strategy

To test the validity of the neutrality view, we estimate a Panel VAR (PVAR) model (see Guloglu and Tekin, 2012; Abrigo and Love, 2016; Bui, 2018; De Santis et al., 2021; Kacou et al., 2022; De Santis et al., 2025), in which each variable is expressed as a function of the lagged values of all other variables, as well as a function of its own lags. The PVAR framework is beneficial for addressing endogeneity concerns arising from reverse causality and feedback

loops between economic performance and financing sources. Feedback effects are assessed through Impulse Response Functions (IRFs), which capture the time profile of the impact of a shock in each of the two financial variables.

A prerequisite for PVAR estimation is that variables must be stationary and not cointegrated. Accordingly, the time-series properties of the variables are tested. If the variables are stationary, they enter the PVAR in (log) levels; if they are non-stationary without cointegration, they are included in first (log) differences. If series are cointegrated, they can be used in (log) levels, and the Vector Error Correction Model can be estimated. Online Appendix 1 (Tables A1 and A2) shows the tests for unit root, cointegration, and cross-sectional dependence (CSD). Most series are non-stationary with significant CSD, and a cointegration relation does not exist. The lag selection procedure indicates that the optimal lag length is 1 (Table A3). Thus, our PVAR model can be represented as a system of dynamic equations in first difference linked through the error terms, as follows:

$$\Delta Y_{i,t} = B \Delta Y_{i,t-1} + \gamma_i + \theta_t + E_{i,t}$$

where B is the matrix of coefficients, ΔY is the vector of endogenous variables, and E is the vector of idiosyncratic errors (i.e., zero mean, constant variance, and no serial correlation within panels). The time index t refers to years in the sample period (2000-2021), and i denotes the country index. The vector θ contains a full set of time dummies to control for CDS, while the vector γ contains country fixed effects.

Our baseline specification (Model 1) includes Gross Value Added (GVA), Investment (Inv), market-based finance (Market), bank-based finance (Bank), and other external finance (OthFin). Alternative specifications replace Inv with Tangible Investment (Tangibles), Intangible Investment (Intangibles), IPP Investment (IPP), and R&D Investment (RD).

The PVAR model is estimated for the full sample of EU countries and the two subgroups of old and new member states (OMS and NMS). Estimation is performed using the GMM approach, with lags 2 and 3 as instruments. This will allow for controlling for endogeneity caused by omitted variables, provided that instruments are valid. The neutrality view is assessed by examining the IRF profiles of performance indicators in response to shocks to each of the three sources of external finance. Specifically, we first test the following hypothesis:

Hp1: If the neutrality view is held, the responses of performance indicators to shocks in Market, Bank, and OthFin should exhibit similar time profiles.

In addition, we investigate whether the effects of financial structure differ between advanced (OMS) and developing (NMS) countries, thereby providing evidence on the theory of evolving financial systems. The second hypothesis is therefore:

Hp2: Investment and GVA performance in advanced economies (OMS) benefit more from increases in market-based finance, whereas emerging economies (NMS) benefit more from bank-based finance.

Causal interpretation of IRF estimates requires exogenous shocks. We rely on Cholesky decomposition to identify exogenous shocks, ordering variables from the most exogenous to the least exogenous, and assuming that shocks are transmitted to other variables with a lag. Our model treats financial variables as the most exogenous, affecting investment and GVA with a delay.

Finally, we extend the analysis along two dimensions. First, we re-estimate all specifications (Model 2) by disaggregating market-based finance into shares and other equities (Shares) and debt securities (Bonds). This step reflects the growing literature emphasizing the role of equity finance in supporting innovative and intangible investment (Didier and Cusolito, 2024; EIB, 2025). Second, we test the robustness of our findings to alternative country classifications. Specifically, we adopt the Risk Capital Index (RCI) (see AFME, 2024), which differs from the OMS/NMS classification by reallocating Cyprus, Estonia, Latvia, and Lithuania into the advanced group, and Belgium, Spain, Italy, and Portugal into the less-advanced group (see Table A1 in the Online Appendix).

IV. Econometric Results

A. Discussion of the results

Before analyzing the Impulse Response Functions (IRFs), we assess the PVAR estimates' stability. Figures A1 and A2 present the eigenvalue stability conditions and confirm that the estimates are stable across all specifications. In addition, the GMM estimates perform well concerning overidentification, as indicated by the Hansen tests reported at the bottom of each panel in Table A3 in the Online Appendix. These tests confirm the validity of the overidentifying restrictions.

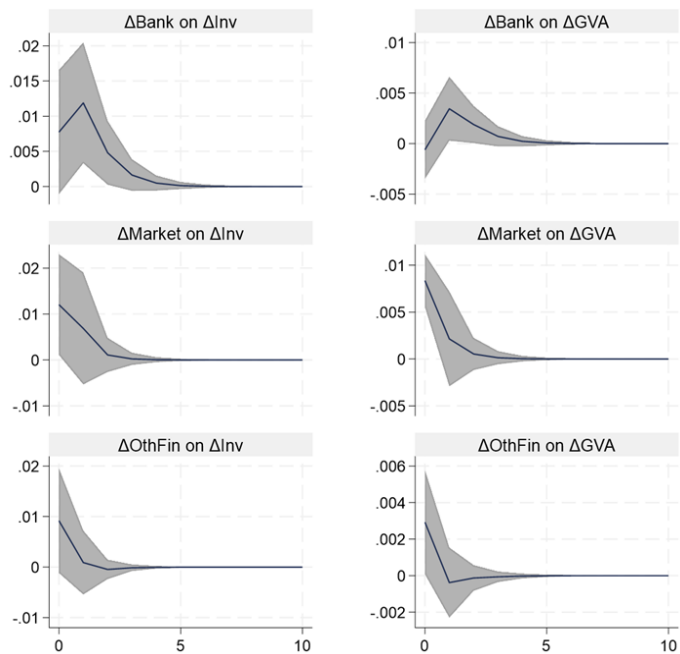
Turning to the analysis of IRFs, Figure 4 shows the results for Model 1, focusing on the impact of EU NFCs' financial variables on Investment and GVA. Both bank-based and market-based finance stimulate an increase in corporate investment. Bank finance raises investment in the two periods following the shock, whereas the effect of market-based finance is immediate but short-lived. The impact of other external finance is similar to that of market-based finance. The effects on GVA follow a similar pattern, with the main difference being the lower significance of bank-based finance. The differences in timing and magnitude of the responses of investment and

GVA to shocks in market- versus bank-based finance provide evidence against the neutrality view.

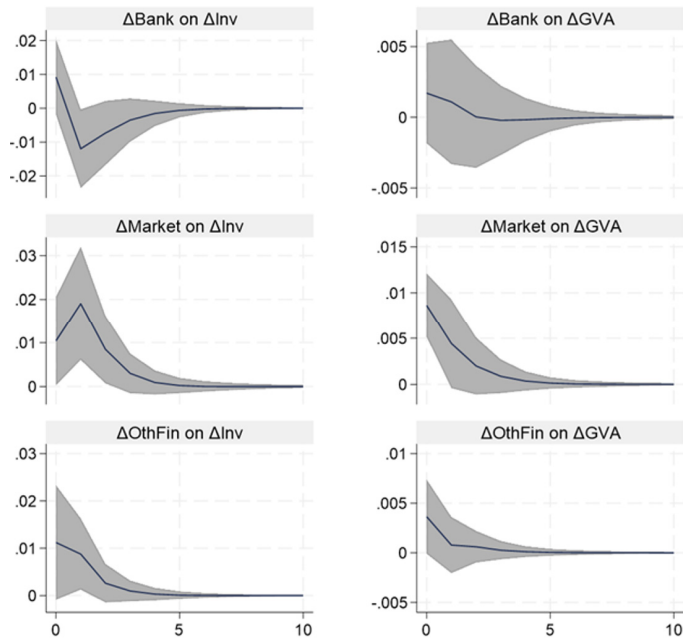
Figures 5 and 6 present the IRFs for the two sub-samples. Regarding the OMS group, bank-based finance is negatively related to investment growth, while a shock to market-based finance leads to higher corporate investment in periods 0, 1, and 2. The maximum effect is reached after one period, amounting to 0.02 standard deviations. Given that the standard deviation of investment growth in OMS is 10%, using market-based finance increases the investment growth rate by 0.2%. Conversely, bank-based finance reduces corporate investment growth by 0.1%.

Regarding the NMS group (Figure 6), bank-based and other finance increase corporate investment, whereas market-based finance is insignificant—the positive effect of bank-based finance on investment peaks at 0.035 standard deviations one period after the shock. Considering the standard deviation of corporate investment growth in NMS is 15%, this corresponds to an increase in corporate investment growth of 0.5% (0.035×0.15). The effect of bank-based finance on GVA is less pronounced, while market-based finance significantly increases GVA growth, reaching 0.01 standard deviations after the shock.

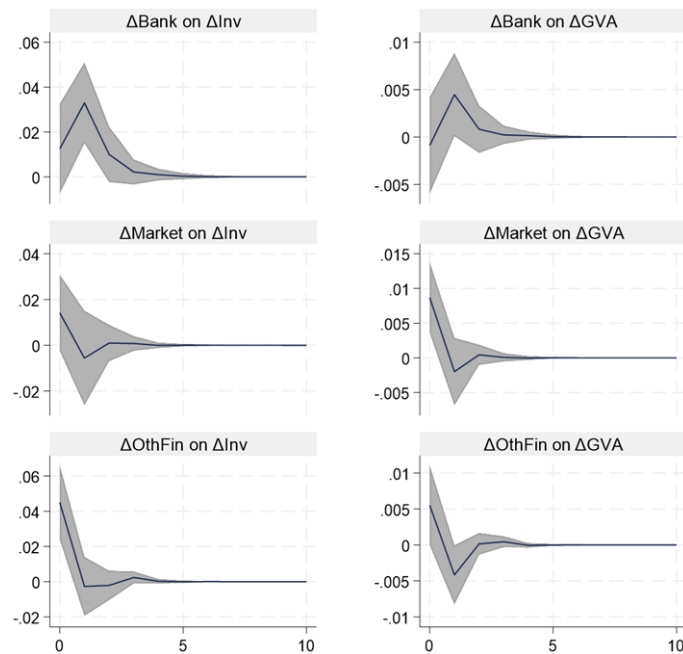
Figure 4. Impulse response functions - Model 1 EU



Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 5. Impulse response functions - Models 1 EU OMS

Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 6. Impulse response functions - Model 1 EU NMS

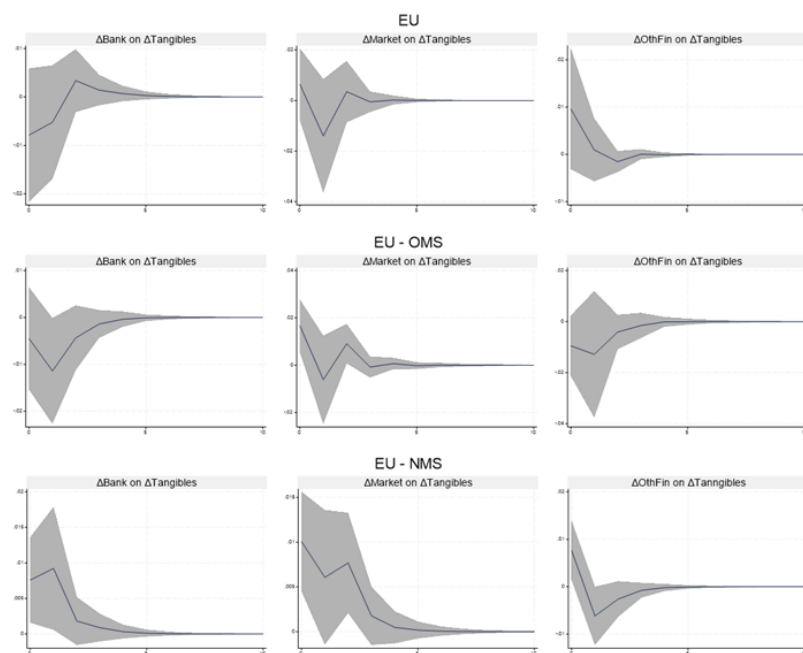
Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 7 shows the responses of tangible investment to shocks in financial variables. No significant impact is found for the EU, but market-based finance significantly affects tangible investment in both OMS and NMS. In NMS, bank-based finance also positively contributes to tangible investment. For intangible investment (see Figure 8), positive shocks to market-based finance and other finance increase investment at the EU level. NMS drives this effect, as responses in OMS are insignificant. In NMS, the impact of market-based finance is 0.03 standard deviations in the first period and becomes insignificant thereafter. Given that the standard deviation of intangible investment growth in NMS is 12%, the actual impact of an increase in the standard deviation in market-based finance growth amounts to 0.36%.

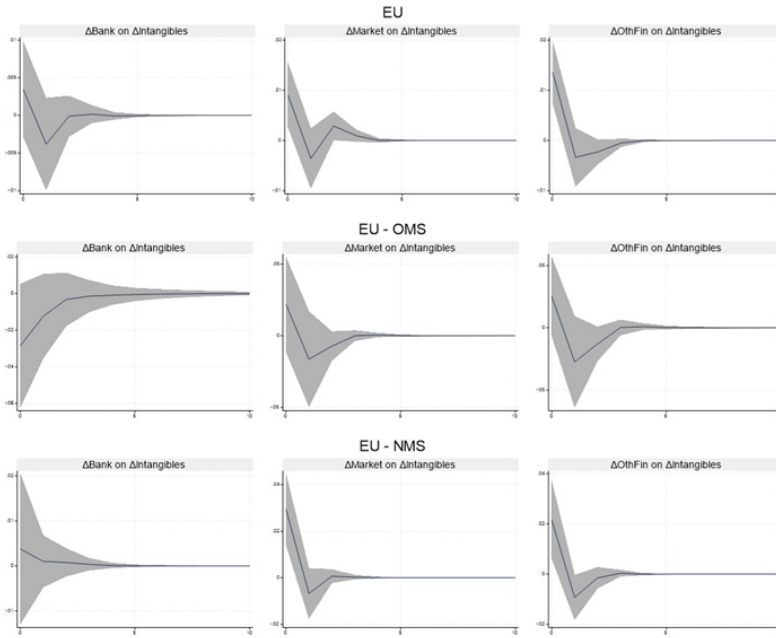
Figure 9 reports the responses of IPP investment to shocks in financial variables. Bank-based finance does not significantly affect IPP investment growth, while market-based finance is significant in OMS and NMS. In OMS, the effect is initially positive and remains significant for two periods, while in NMS, the effect is significant only immediately after the shock. In OMS, an increase of one standard deviation in market-based finance growth raises investment growth by 0.01 standard deviations in each of the first three periods, resulting in a cumulative increase of 0.36%. In NMS, the effect is smaller, being equal to 0.18%.

Finally, Figure 10 shows that the responses of R&D investment growth to shocks in financial variables are insignificant.

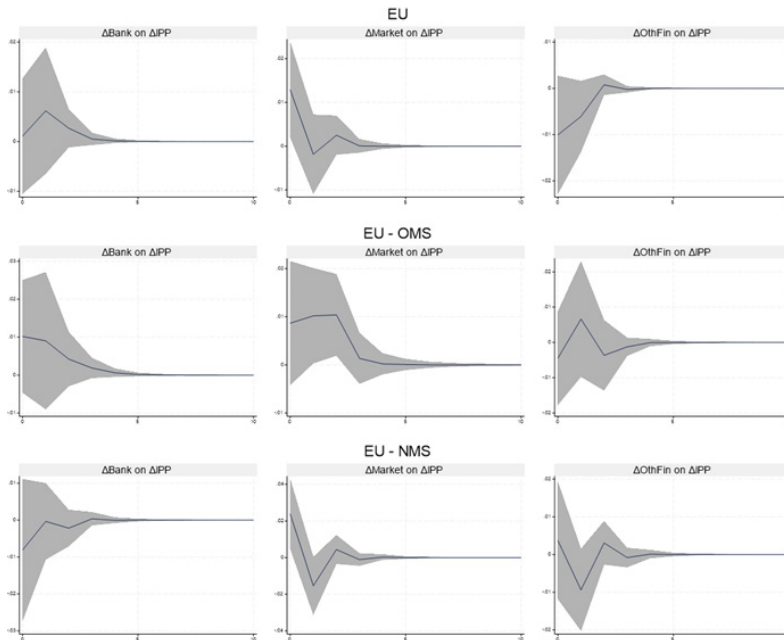
Figure 7. Response of tangible investment to financial structure variables - Model 1



Note. Impulses and responses are calculated in terms of standard deviation changes

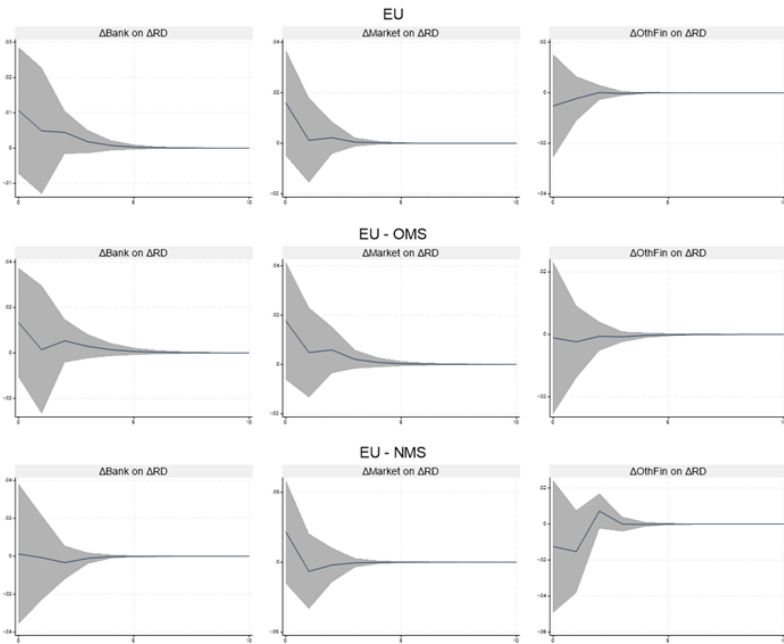
Figure 8. Response of intangible investment to financial structure variables - Model 1

Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 9. Response of IPP investment to financial structure variables - Model 1

Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 10. Response of R&D investment to financial structure variables - Model 1

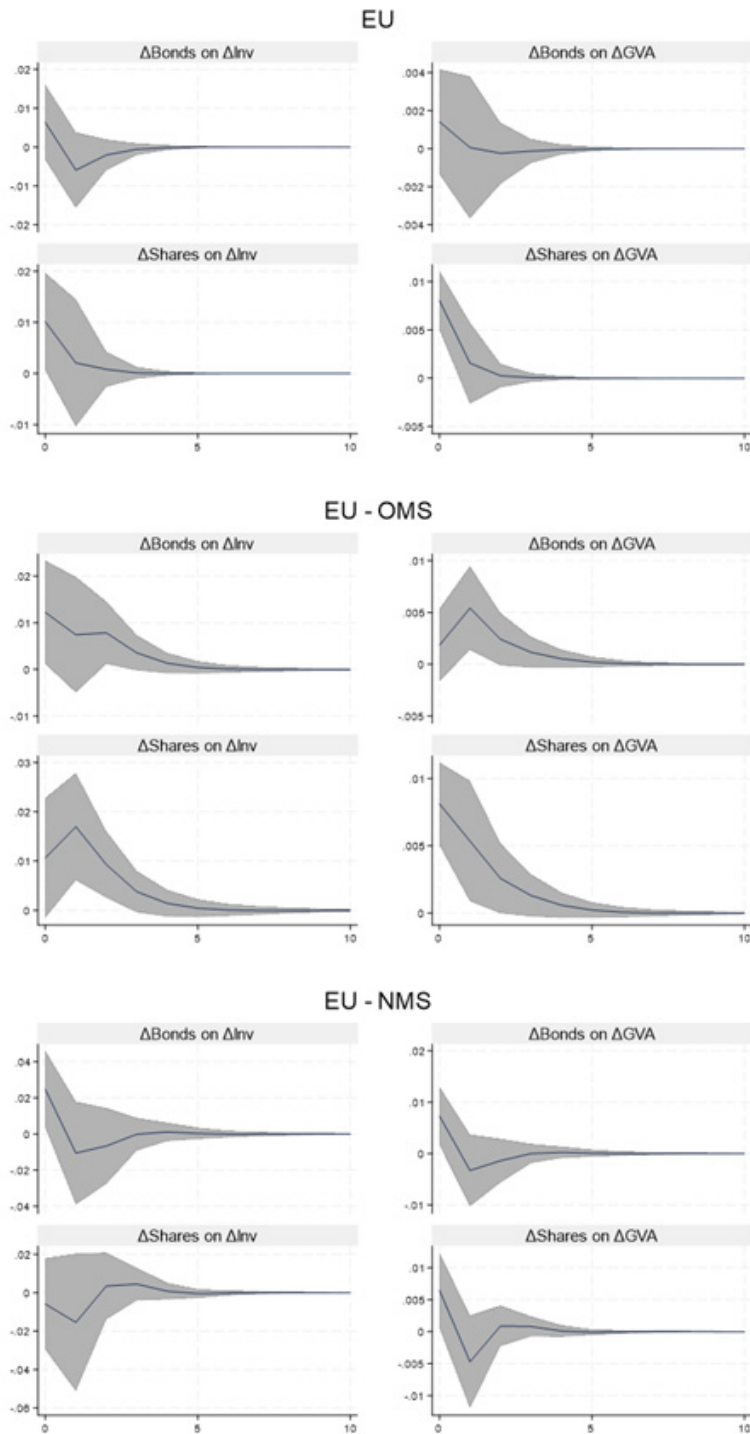


Note. Impulses and responses are calculated in terms of standard deviation changes

To summarize the econometric results, the IRF analysis provides several indications. First, bank-based and market-based finance affect corporate investment and GVA growth differently, disproving the neutrality view. Second, market-based finance is more effective in stimulating corporate investment in advanced economies, while bank-based finance is more effective in emerging economies. Third, in NMS, bank-based finance is beneficial for stimulating investment in tangible assets. Fourth, investment in intangible assets, especially intellectual property products, is stimulated by market-based finance in both regions, with stronger effects in OMS. The Forecast Error Variance Decomposition (Table A5 in the Online Appendix) confirms these results.

B. Robustness and extension

Having established the greater effectiveness of market-based finance in stimulating investment growth, this section aims to disentangle the effects of equity finance and debt finance. Figure 11 presents the EU, OMS, and NMS results, respectively. Equity finance is the primary driver of the results for the EU and OMS. By contrast, bonds are more effective in stimulating investment for NMS.

Figure 11. Impulse response functions - Model 2

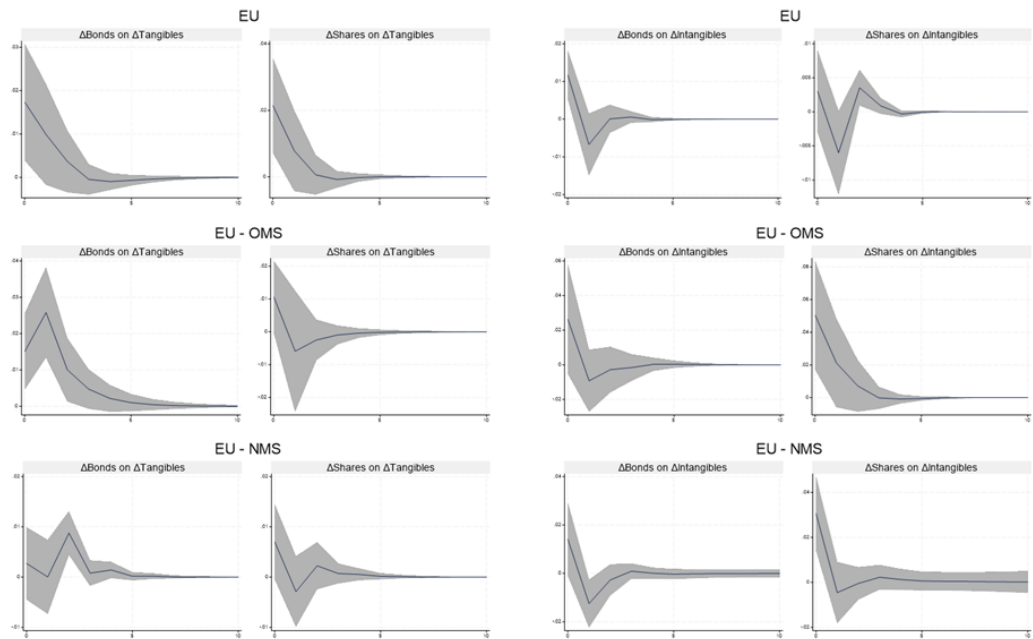
Note. Impulses and responses are calculated in terms of standard deviation changes

Turning to investment in tangible and intangible assets (Figure 12), both bonds and equity increase tangible investment at the EU level, while the effect on intangible investment is less clear. The impact of bonds on tangibles is positive and significant in both OMS and NMS, whereas the effect of shares is significant but short-lived in OMS. For intangibles, bonds are only marginally significant in NMS, while shares are significant in OMS and NMS.

Focusing on IPP and R&D investment (Figure 13), shares prove more effective than bonds in both OMS and NMS. These findings are consistent with recent contributions in the literature (see Yano and Shiraishi, 2020; Demmou and Franco, 2021; Didier and Cusolito, 2024; EIB, 2025).

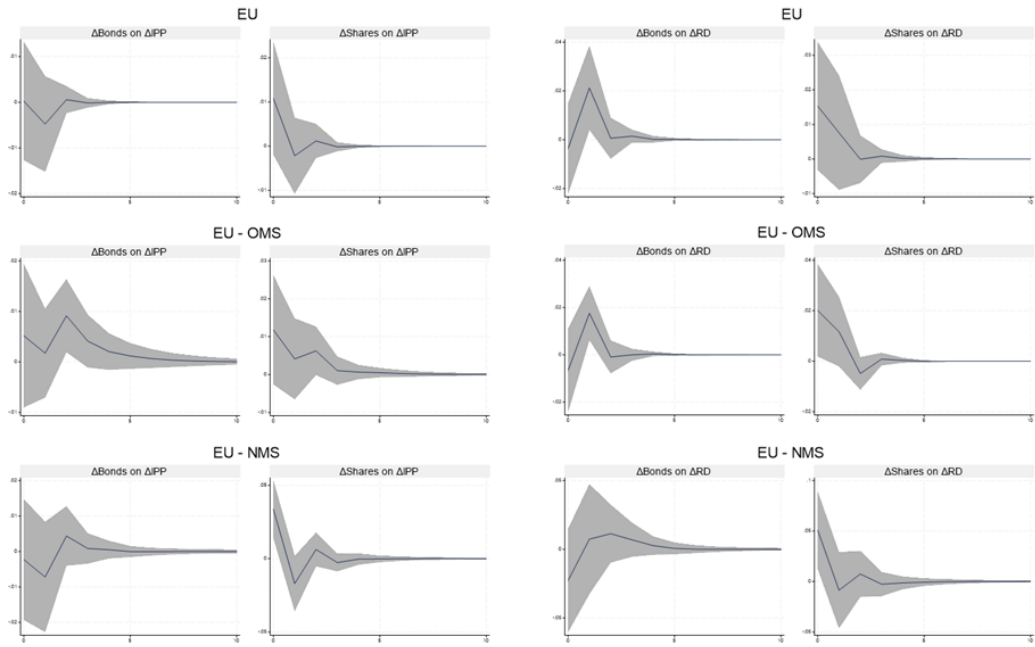
Finally, Figures A2 and A3 in the Online Appendix confirm that the main results remain robust when using the AFME’s RCI-based country classification. The Forecast Error Variance Decomposition shown in Table A6 also confirms the results.

Figure 12. Response of tangible (left panel) and intangible (right panel) investment to financial structure variables- Model 2



Note. Impulses and responses are calculated in terms of standard deviation changes

Figure 13. Response of IPP (left panel) and R&D (right panel) investment to financial structure variables- Model 2



Note. Impulses and responses are calculated in terms of standard deviation changes

V. Conclusions

In this paper, we have offered descriptive and econometric evidence on the relationship between the structure of the financial markets and the economic performance of the NFCs, taken as a whole and grouped into two different sub-groups of EU countries. In this last respect, we distinguished between the so-called old member states, with an EU membership preceding 2004, and the so-called new member states, with an EU membership following 2004. Our exercise has covered an extended period: it started with the implementation of the EA (2000) and lasted until the recovery from the pandemic shock (2021).

The main results of our analysis are the following. First, for the EU as a whole, both bank-based and market-based finance increase the growth rate of investment, whereas the growth rate of GVA positively reacts only to market-based finance. Second, substantial differences are found between OMS and NMS countries, since market-based finance is more effective in OMS countries and bank-based finance is more effective in NMS countries. Third, when investments by asset type are distinguished, we find that bank-based finance stimulates investment in tangible goods in NMS countries. However, market-based finance positively affects intangible investment

in both groups. Market-based finance has a particular positive impact relative to investment in Intellectual Property Products. Fourth, we find different impacts of debt and equity finance within market-based finance because the latter is more effective in stimulating intangible investment. In contrast, the former is more effective in stimulating tangible investment. This result holds for both OMS and NMS countries. Fifth, equity finance plays a positive role in stimulating R&D investment.

Our results lead to three implications: the 'neutrality view' is inconsistent with empirical evidence, and the structure of the financial markets has a significant but different impact on the 'real' activities of the old and new EU countries. The first implication is not so innovative. As we have recalled in Section 2, a broad strand of theoretical and empirical literature has already criticized the neutrality view in the past and more recently. The second implication is, instead, more interesting because it empirically supports a theory that is not the dominant one: the so-called view of evolving financial systems. The recent debate has focused on the improvements guaranteed by the development of market-based finance. Our evidence does not disprove this position concerning the old EU countries, but it shows that bank-based finance can remain more efficient in the new EU countries, except for the most innovative investments.

Let us specify the last statement, which is at the core of our econometric exercise. According to the theory of evolving financial systems, bank-based finance is more suitable for fostering growth in countries with high transaction costs and less developed market mechanisms. In contrast, market-based finance substantially improves more dynamic economies with widespread market mechanisms of standardized prices. Furthermore, our econometric analysis provides evidence of the higher effectiveness of market-based finance in stimulating innovative investment in EU countries.

This evidence partially aligns with the most recent theoretical and empirical contributions (see Gambacorta et al., 2014; Pagano et al., 2014; Langfield and Pagano, 2015; Levine et al., 2016; Yano and Shiraishi, 2020; Demmou and Franco, 2021; Didier and Cusolito, 2024; EIB, 2025). It confirms the importance of market-based finance with reference to the OMS, and it recognizes that the development of market-based finance would stimulate the growth of NFCs as far as innovative investments are concerned. Hence, a more significant role of market-based finance should be a priority of the financial regulation and policies in the European developed countries that are still too dependent on bank credit. However, following the view of evolving financial systems (see Boot and Thakor, 1997, and Demirgüç-Kunt et al., 2013), our empirical findings qualify this implication relative to the NMS. In the latter set of countries, strengthening bank financing could positively affect short- to medium-term economic growth if focused on tangible investment.

The replication of our econometric exercise at the national level would likely underline that each of the EU countries has financial markets characterized by differentiated structures in

different territorial zones, despite the predominance of market-based or bank-based finance in the aggregate. Hence, it is likely that the economic growth in each of these countries would be improved if there were a gradual evolution in the financial structure of these different zones.

These considerations, including the last hypothetical implications, recommend gradual and complex policies to develop the EU financial markets. In most EU countries, banks still enjoy the most comprehensive role in the supply of financial services, independently of the need for more articulated financial markets. Thus, it is a priority to strengthen market-based finance in the EA countries. However, this first conclusion requires qualifications. The need to overcome the excessive role currently played by banks' financing in the old EU members does not mean that these countries are entirely free from areas affected by important information asymmetries and high transaction costs. These features of the financial markets are more widespread in most of the new EU countries. Hence, the need to increase the weight of non-bank financial intermediaries relative to the banking sector does not mean that the European financial system can only focus on pure market relations. The latter cannot replace the substantial information advantages, and the robust customer relationships banks enjoy.

Our conclusion has clear economic policy implications. The growing role of the market-based financial structures requires building a unified EU financial market. However, this achievement should be combined with efficiency improvements in the bank-based financial structure that require overcoming national fragmentations; hence, the completion of the Banking Union process remains a fundamental issue. The EU's policies should shape a structure of financial markets where the bank-based and the market-based financial institutions have room to effectively pursue their respective goals in correspondence to the main features of the 'real' activities.

This recommendation applies explicitly to the current European situation. The policy mix, implemented by the EU institutions to respond to the pandemic shock, has implemented the 'Recovery and Resilience Facility.' This program, which has allocated significant flows of central financial resources to member states to implement the digital and 'green' transitions and to strengthen social inclusion in the changing world, will last until 2026. Meanwhile, the EU economy has been hit by new adverse shocks and is facing growing geopolitical uncertainty internationally. Hence, achieving the two transitions and strengthening the European social model requires a massive mobilization of private financial resources that should be extended beyond 2026. This mobilization requires well-functioning and unified European financial markets. Hence, *a fortiori*, it is necessary to complete the EU's financial architecture by completing the Banking Union process and operationalizing the Capital Markets Union. It is also necessary to combine market-based and bank-based finance in efficient ways.

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