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Bank-based or Market-based financial sources: Which is better for the EU?

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Working Paper 19/2021

LUISS

November 8, 2021

Bank-based or Market-based financial sources: Which is better for the EU?*

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Abstract

This paper examines the relationships between the financial structure and the economic performance of non-financial corporations in the European Union (EU). The analysis covers the 1999-2018 period, thus allowing us to consider both the different cyclical phases and the process of enlargement of the EU and the Euro Area (EA). We investigate how the relative weight of market-based and bank-based finance affects the real performances of non-financial corporations across countries. Our results indicate that market-based finance is more effective than bank-based finance in supporting the growth of gross value added and investments of these corporations. Our findings hold when considering a break for the financial crisis (2008-2009), and are confirmed via a panel VAR specification. They may suggest a need to pursue a new balance between markets and intermediaries in the EU and EA by strengthening the role of the non-banking segments of financial markets.

Keywords: European Union; Growth; Investment; Financial structure, Non-financial Corporations, Gross value added.

* This paper is one of the results of the research project financed by the European Investment Bank (EIB) on 'Changes in the European financial markets and the financing of non-financial firms". The project has involved seven researchers of the Luiss School of European Political Economy (SEP), under the coordination of Marcello Messori, and has been developed in cooperation with Laurent Maurin, as EIB's project director. We warmly thank the other participants of the group, i.e., Pier Paolo Benigno, Paolo Giordani, and Alessandra Marcelletti as well as Laurent Maurin for their contribution to the analytical framework and for several discussions on the specific content of this paper. The responsibility of the final draft should be attributed to the authors.

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1. Introduction

In the thirty years preceding the pandemic shock, the economic performance of the European Union (EU) countries deteriorated substantially compared to both other advanced and developing countries. The same deterioration applies to the Euro Area (EA) despite the cyclical prosperity from its beginning (1999) to the advent of the global financial crisis (2007). That crisis and the subsequent adjustments further exacerbated this trend. This economic weakness in both the EU and the EA can be largely imputed to a substantial slowdown in internal investments. Even before the outbreak of the pandemic, the investments were largely below their pre-financial crisis level in most EU countries. In the first years after the financial crisis, a possible recovery of the EU's public and private investments was heavily limited by the recessionary fiscal policy stance and the increase in economic and institutional uncertainty. Even though the European Central Bank's (ECB's) monetary policy was expansionary in the periods 2007 – 2009,[5] end 2011 – mid 2012, and mid-2014 – 2018, in these same periods the European banking sector was affected by deleveraging processes, liquidity and insolvency crises, and the EA economy faced the risk of deflation. These factors implied long phases of credit crunch and worsened the propensity of European firms to increase their investments.

It is important to emphasize the last point. Compared to other developed areas, many countries in the EU – and more specifically – in the EA were characterized by the predominant role of bank loans with respect to other non-banking sources of financing of the real activities.[6] The global financial crisis and the subsequent years led to heavy constraints in bank loans. In addition to the 2007-2009 bankruptcies of several intermediaries and the impact of the EA's sovereign debt and banking crises, financial regulation became more severe. Basel II was further implemented, the substantial introduction of the new rules of Basel III was antedated, the European Banking Authority (EBA) and the ECB as new supervisory mechanisms of the EA's banking sector (since November 2014) adopted more binding initiatives.[7] These new rules implied substantial increases in capital requirements, in liquidity buffers, and in the 'second pillar' ratios. In the short term, they had a pro-cyclical bias which further reduced

[5] Let us recall, by the way, that the ECB decided to increase its policy rates immediately before the peaks of the global financial crisis and the EA's sovereign debt crisis.

[6] This still applies today despite that, in the last fifteen years, the EA has doubled the incidence of non-banking loans and corporate bonds on total financing (see Schnable, 2020 and 2021; see also Messori, 2019).

[7] We will outline below a few aspects of the recent evolution in European financial regulation and supervision. Detailed overviews of the main aspects of this evolution are offered by Angeloni (2020), and Lannoo and Thomadakis (2019).

lending during the European recessions. However, new European regulation and supervision were unavoidable due to the fact that ungoverned credit booms played a crucial role in the accumulation of imbalances among the strongest ('core') and the most fragile ('periphery') countries during the first phase of the EA (1999 – 2006), as well as in causing the financial crisis. Moreover, the EA's internal imbalances worsened the impact of the financial and European crises on the peripheral countries (see, for example, Esposito and Messori, 2019).

The initiatives taken by the European institutions to limit the abovementioned negative issues were not fully conclusive. The Banking Union process (2012-2014), aimed at building an effective European banking area with limited national segmentations, is still uncompleted and unable to centrally handle bank restructuring and bankruptcies (the so-called resolution processes) and to centrally protect depositors. The Capital Markets Union, launched in 2016 and aimed at enlarging the span of instruments to finance real economic activities, produced a promising legal framework but did not make adequate progress in increasing EA firms' recourse to market-based finance. These difficulties have been exacerbated by the pandemic shock and the related dramatic economic depression. During the pandemic, the liquidity and solvency problems of a number of European firms were temporarily overcome by incentivizing the European banks to continue their generous lending activities. In this respect, the ECB strengthened its T-LTRO III program and complemented it by a renewal of the LTRO, and the EA national governments offered a huge amount of guarantees and approved long standstill periods.[8] The result is that the over-indebtedness of a part of European firms is reaching a peak; therefore, it is reasonable to predict that there will be a need to substantially deleverage in the European banking sector in the upcoming years. Hence, it is all the more crucial to develop non-banking sources of finance in the EA and EU.

This statement is strengthened by the increasing theoretical and empirical contributions opposing the 'neutrality view', that is, the view that no specific financial structure is superior to others in stimulating economic growth.

A strand of literature has affirmed that market-based systems performed better than bank-based systems in the most advanced economic areas before the global financial crisis (Levine and Zervos, 1998; Rajan and Zingales, 1998; Levine, 2002; Beck and Levine, 2002). Despite the evidence that the

[8] An analysis of the ECB's recent initiatives to pump additional liquidity through the banking channel is offered by Benigno *et al.* (2021). This analysis specifies the main features of the Targeted Longer-Term Refinancing Operations (T-LTRO) as well of the new Longer-Term Refinancing Operations (LTRO).

unregulated financial innovations were at the root of this crisis, the approach in favor of the market-based financial structures gained further consensus after 2009, due to the vulnerability of banks' balance sheets to the fall in asset prices and to borrowers' insolvency (Non-Performing Loans: NPLs), which led to the credit crunch. In this sense, several recent studies have documented the superior performance of market-oriented systems in advanced economies (see Gambacorta *et al*, 2014; Pagano *et al*, 2014, Langfield and Pagano, 2015, Levine *et al.* 2015). The common belief is that market-oriented systems lower cyclical volatility and the consequent systemic risk (Bats and Houben, 2020). Conversely, the higher cyclical volatility of bank credit might lead to bubbles (Adrian and Shin, 2014) during economic expansionary phases, while fostering banking crises during recessionary phases.

In our paper, we offer an empirical contribution to the strand of literature just mentioned. We explore the relationships between the financial structure and the economic performance of non-financial corporations in all EU Member States during a time window that goes from 1999 to 2019. The usual approach, taken in the related empirical literature, focuses on data representing the structure and the evolution of financial markets at a macro-systemic level. For instance, the reference is to financial indexes such as total private credit to GDP, bank credit to GDP, and – alternatively – stock market and non-financial debt capitalization. One of the novelties of our paper lies in the focus on non-financial corporations (NFCs). We analyze the possible relationships between the composition of the financial structure (that is, market-based vs. bank-based sources), characterizing the activities of these corporations and their economic performances in terms of investment and value-added growth.

Let us explain the role of NFCs' financial structure. We rely on two main variables: a market-share index and a bank-share index representing, respectively, the share of market-based and of bank-based finance in NFCs' total financial liabilities. We then use an augmented growth equation to estimate the impact of these two indexes on the growth of NFCs Gross Value Added (GVA) and investments. We take into account other possible factors by grouping the EU countries according to their level of development and their seniority in the EA membership. These factors of national heterogeneity aim to investigate if the role of NFCs' financial structure is affected by the national macroeconomic evolution over time. The analysis is carried out using, alternatively, static fixed-effects estimates and a Panel VAR approach based on GMM regressions. The latter approach is particularly useful for verifying the possible endogeneity in the relationships between financial structure and economic performance, due to reverse causality and the omitted factors affecting both variables. In addition, this same approach allows us to

identify the time dynamics of the response that the performance variable has to a shock in each of the two shares, i.e. market-share and bank-share.

Our econometric model also separately estimates the possible impact of the different components of NFCs' investments. More specifically, we distinguish between standard investment activities, identified with the investments in Constructions and Machinery & Equipment (CME), and investments in Information and Communication Technology (ICT) and in Intellectual Property Products (IPP). This distinction allows us to explore the various channels through which the financial systems can impact on NFCs' economic performance. We are, in fact, in the condition to measure the ability of these channels to (i) generate value directly at NFCs level, (ii) foster capital accumulation (total investment), (iii) promote innovative investments at country level, and (iv) support a more traditional sector with investments in construction at country level.

Our paper can thus provide a rich set of up-to-date evidence on the relations between the financial structure and the economic performance of NFCs in all EU countries. Let us just stress two main points. First, the series of NFCs' data, aggregated at country level, cover both the positive cycle of the early EA phase and the crisis and post-crisis periods. Secondly, these series make evident the intra-EU differences in the role played by NFCs' financial structure in terms of economic performances.

The remaining part the paper is structured in the following way. Section 2 discusses the main theoretical and empirical contributions to the literature on the relationships between financial structures and economic growth. Section 3 offers descriptive empirical evidence on this subject. Sections 4 and 5 specify the methodological approach and discuss the econometric results. Section 6 concludes the paper.

2. Survey of the literature

Throughout the 20th and early 21st centuries, economists have widely debated about the interconnections between the financial system and economic growth. Research focused on two main questions. The first relates to the possible support that the size of the financial sector offers to economic growth. The second question debates if the composition of the financial structure (market-based versus bank-based) can affect economic growth and economic stability.

Throughout the past decades many theoretical contributions have highlighted that financial development, measured in terms of growing financial intermediation, tends to positively influence he amount and the efficiency of investments (see for instance, Goldsmith, 1969; Greenwood and Jovanovich, 1990; Bencivenga and Smith, 1991). Empirical literature has built upon this theoretical

debate, updating the research questions and refining the responses. King and Levine (1993a and 1993b) show that the degree of financial intermediation is strongly correlated with the long-run rates of economic growth, capital accumulation, and productivity dynamics. The two authors utilize different proxies to assess financial development, even if – at the beginning of the 1990s – the focus was on the banking sector. They use, in fact, a measure of financial depth[9] together with the amount of credit lent to private NFCs as a share of GDP. Later contributions started focusing on financial markets as being distinct from traditional financial intermediation. For instance, Levine and Zervos (1998) investigate whether stock market liquidity, size, and volatility are correlated with economic growth.[10] They also consider a measure of banking development and the ratio of bank loans to private firms over GDP. Subsequent papers highlight that financial development can be beneficial for industries relying more on external finance, such as R&D intensive and high-tech sectors (Rajan and Zingales, 1998; Beck and Levine, 2002; Kumar *et al.*, 1999).

After this first series of contributions, the recurrent episodes of market and bank bubbles pushed both the theoretical and empirical analyses to question the positive relationship between the size of the financial sector and economic growth. Empirical evidence has pointed out that the positive effect of the growing size of a financial system is not unlimited (Pagano and Pica, 2012). Hence, according to various studies (Cecchetti and Kharroubi, 2012; Manganelli and Popov, 2013; Arcand *et al.* 2015), an oversized financial system can be detrimental for economic growth and for the stability of an economic system (Easterly *et al.*, 2000). This new evidence suggests that the relation between the size of financial systems and economic growth can be properly expressed by an inverse U-shaped curve.

Supported by the idea that stock markets and banks provide different services, researchers have started focusing on a different question, that is, whether the structure of the financial sector (market-based versus bank-based) matters for economic growth. This further question inspired a strand of literature challenging the validity of the so-called 'neutrality view'. The main contributions dispute that no specific financial structure is superior to others in stimulating economic growth (Levine and Zervos, 1998; Rajan and Zingales, 1998; Levine, 2002; Beck and Levine, 2002). The authors offer empirical evidence, especially with reference to more recent data, demonstrating that the financial structure has significant effects on real per capita long-run growth (see Pagano *et al*, 2014; Langfield and Pagano,

[9] This consists of the ratio of liquid liabilities to GDP.

[10] The size is measured as the value of listed domestic shares on domestic exchanges divided by GDP. This measurement is utilized as an alternative to two other possible indicators: the value of stock trading relative to the size of the market and the value of trading relative to the size of the economy.

2015; Levine *et al.*, 2015). However, this literature also maintains that bank-based and market-based structures have different pros and cons, so that their specific impact on economic performance cannot be assessed solely in a systematic and aggregate way. It is crucial to also consider the socio-economic features of the 'real' economic system, in the sense that the country's characteristics affect the efficiency and effectiveness of the two types of financial structure. The conclusion is that none of the two financial structures should be considered superior in absolute terms but, contrary to the 'neutrality view', each of the two is more effective in specific circumstances. Hence, the main analytical problem is the selection of the variables that matter for the identification of these circumstances.

Different papers focus, respectively, on the strength of property rights (La Porta *et al.*, 1997; Levine, 1997), social culture (Kwok and Tadesse, 2006), and industrial structure (Carlin and Mayer, 2003; Allen *et al.*, 2007). Here we aim to provide neither an exhaustive nor a conclusive classification of these variables. It is sufficient to recall that the most recent literature largely agrees that market-based financial structures are better suited to support an economic growth centered on innovation activities. Moreover, many authors also maintain that market-oriented systems perform better during downturns and recovery periods (see Gambacorta *et al.*, 2014) because the excessive volatility of the bank credit supply tends to exacerbate the business cycle. Finally, various papers document that bank-oriented systems exhibit higher systemic risks (Reinhart and Rogoff, 2011; Langfield and Pagano, 2015; Bats and Houben, 2020); and even if there is no direct link with economic growth, systemic risk will affect various variables (uncertainty, stability, and so on) that are important as determinants of growth.

The main implication drawn by the literature from this additional empirical evidence is quite important because it ends up crediting the so-called theory of evolving financial systems, which had previously been dismissed: bank-based and market-based financial structures tend to dominate in different stages of economic activities. That theory identifies different stages along a ladder of economic development. To simplify matters, here let us only refer to two stages that continue to indicate a sequence of economic development but that are also due to different path dependences in advanced economies.

The first stage characterizes economies which still suffer high 'transaction costs' and the second stage characterizes economies with widespread market mechanisms of standardized prices.[11] Bank-dominated financial systems perform quite well in economies with high transaction costs (Boot and

[11] The concept of 'transaction costs' was introduced in the economic debate by Coase (1937). More recently, it has become pivotal in the analytical structure of an important strand of literature: the so-called neo-institutionalism (see Williamson, 1975 and 1989). The modelling of 'transaction costs' offered by various contributions in contract theory (see Tirole, 1988; Hart 1995) justifies its opposition towards market prices.

Thakor, 1997; Boyd and Smith, 1998; Levine, 2005), that is, in economies in which the degree of market transparency and the quality of economic governance are low. In an opaque market structure with asymmetric or incomplete information, banks prefer to avoid transaction costs and rather deal with the consequent high agency costs in financial markets handling 'adverse selection' and 'moral hazard' problems.[12] Economies with developed mechanisms of standardized prices are, instead, characterized by liquid and articulated markets and by more sophisticated financial regulation and information. In this setting, new financial decentralized infrastructures and non-bank providers of funds break into the financial scene and can offer more useful services than bank lending to productive activities (see Acemoglu and Zilibotti, 1999; Demigurc-Kunt *et al.*, 2011). Thus, bank intermediation tends to lose its centrality.

The EU and the EA include the most advanced economic areas in the world. However, in comparison with the United States, the EU and the EA are characterized by higher transaction costs. Moreover, within the European area, economic systems with either high transaction costs or developed market mechanisms of standardized prices coexist, leading to potentially significant heterogeneity in the effective financial structures and in the relations between the financial structure and economic performance.

To assess the specificity of the European financial market, Pagano *et al.* (2014) analyze European countries by relying on a variable that captures the structure and the composition of the EA financial sector. This composite variable is given by the total equities traded on the domestic exchange and by the total bank credit given to the private sector; moreover, it includes indicators for the role of market and non-market finance, respectively. The evidence found by Pagano *et al.* (2014) stresses that market-based finance has a positive and statistically significant influence on economic growth in the EA because market mechanisms are – on average – strong enough to positively interact with this financial structure. Hence, further development of corporate bonds and equity markets would be beneficial in many European countries. The authors add that an extended banking sector could, instead, distort the allocation of investments due to inefficiencies in the borrowers' selection. In this respect, they emphasize that dominant flows of bank credit are associated, in the EA, with an increased fraction of housing loans

[12] The two mentioned mechanisms characterize the relationships between principals and agents in contracts with imperfect information (see for instance Grossman and Hart, 1983). In the 1970s and 1980s, contract theory elaborated theoretical papers on financial relationships that refer to different markets and intermediaries (see for instance: Arrow 1970; Jensen and Meckling 1976; Rothschild and Stiglitz, 1976). However, the core of this literature was devoted to non-price selection and to incentive designs for borrowers made by banks through the so-called 'credit rationing' (see Stiglitz and Weiss, 1981 and 1992; Milde and Riley, 1988).

relative to company loans and with a corresponding change in the investment mix of the economy in favor of real estate. And this latter allocation would privilege activities typically characterized by lower productivity.

The analysis of Pagano *et al.* (2014) is strengthened by the impact of the global financial crisis on the EA. Descriptive evidence (see for example: Messori *et al.*, 2015) and econometric exercises (see for example; Esposito and Messori, 2019) underline that credit booms in Spain, Portugal, and Greece during the first stage of the monetary union (1999-2007) were among the main causes of those negative (positive) imbalances accumulated in the current accounts of the EA's periphery (core) and compensated by the financial inflows (outflows). When the global financial crisis triggered a "flight to quality" that broke off these financial flows, the negative imbalances became irreproducible. Hence, the EA's periphery was constrained to implement a 'sudden stop' which led to a long recession (2010-2013), worsened by the credit crunch that started in the second half of 2011 due to the excessive leverage, NPLs and the losses on other exposures (i.e. asset prices fall), impairing the balance sheets of European banks. According to Bats and Houben (2020), in this scenario market-based financial systems can offer an effective alternative to bank credit. In fact, these systems would not depend so heavily on highly leveraged financial institutions and, given that the banking sector is unable to operate properly, could provide alternative sources of financing.

The implication of our survey is that consensus is growing in favor of the EA's transition to a market-based system. This does not mean that the latter system is always more efficient than the bank-based system. As we stated above, from a theoretical and empirical point of view, banks can remain more efficient than market relations in dealing with information asymmetries or other imperfections. Thus, to reach a general conclusion it would be necessary to carry out further research and to provide more conclusive evidence in different contexts. Moreover, it should be noted that, in the concrete economic systems, bank loans and market financial assets tend to complement each other. Therefore, in analysing the working of a specific economic area or of different countries within a specific area, it is often important to assess the optimal mix of the two financial organizations. Indeed, in the EA, many countries with high economic performance are characterized by a bank-based finance or – at least – have a robust banking sector.

Given that the theoretical and empirical debate has not reached any clear-cut conclusion on the dominance of market-based vs. bank-based finance, it can be useful to provide up-to-date empirical

evidence on the relations between the specific financial structure of the EU and of the subsets of its Member States, on the one hand, and the corresponding firms' performances, on the other.

3. Preliminary descriptive analysis

Our empirical analysis aims at verifying whether the economic performance of European NFCs was affected, during the 1999-2019 period, by the specific sources of financial funding. This verification is not easy to carry out, due to the interference of several other variables. The 1999-2019 period was characterized by various critical events, which covered all the phases of a long economic cycle starting with the launch of the EA and a phase of economic prosperity and ending with a slowdown that followed a recovery from one of the most severe crises of the last eighty years. Each of the different phases of this period had significant direct and indirect impacts on the working of financial markets, on the funding of NFCs and on their performance. These impacts became crucial during the financial and sovereign debt crises. Thus, it is reasonable to suppose that the financial choices of NFCs evolved during the twenty years examined, and that this evolution was also due to non-financial macroeconomic phenomena affecting firms' organization and performance. In this perspective, it is worthwhile to start with a preliminary descriptive analysis of the main features and evolution of the financial funding of European NFCs. This analysis aims at offering sound and comprehensive foundations for framing the behavior of European NFCs and their performance in the changing economic situation, and for better understanding the setting of our econometric analysis.

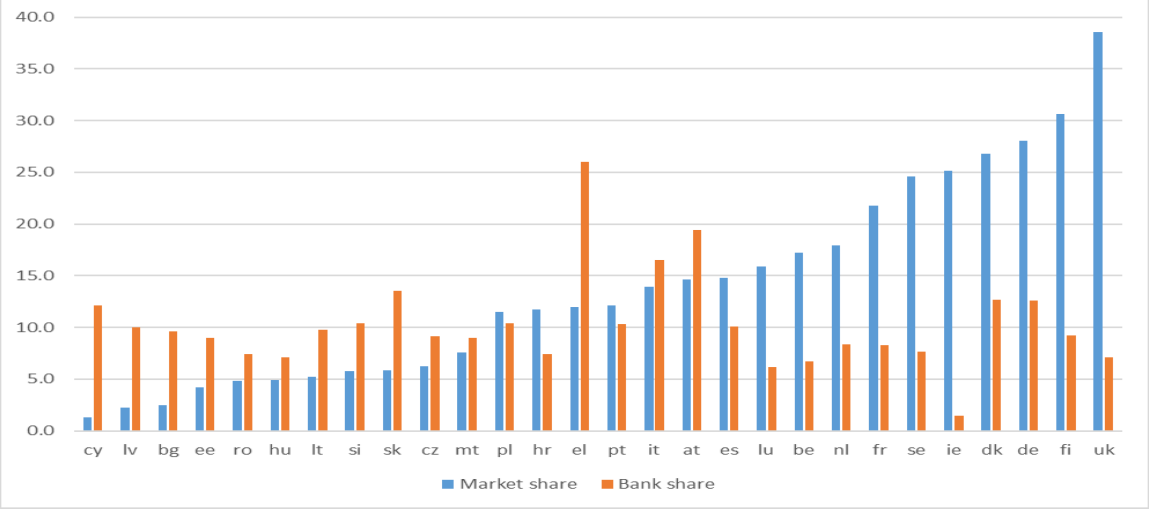
Let us begin by looking at a snapshot of financial structures in the EU in order to show that this area is characterized by bank-based finance but also leaves substantial room for market-based sources. In our paper, bank-based financial instruments are limited to loans granted by Monetary Financial Institutions (MFIs) – with the exclusion of central banks – to NFCs;[13] instead, market-based financial instruments include listed equities, debt securities and investment fund shares. Accordingly, we construct two indexes that separately refer to the two sets of financial instruments as shares of the total financial liabilities of NFCs.[14]

[13] 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 comprise money market funds; hence, bank-based instruments can be extended to some of the money funds' assets.

[14] It is worth noting that our classification of bank-based and market-based financial sources does not wear out the sum total of the NFCs' financial liabilities. The remaining components entering the denominator of our indexes are: other loans, unlisted shares, other equities, pension fund schemes, trade credits, and other payables. The exclusion of these components from the

As shown by Figure 1, at the end of the period under examination and before the pandemic shock (i.e. in 2019), the relative weight of bank-based to market-based finance shows important cross-country differences (see also: Schnabel 2021). Roughly speaking, we can distinguish between two groups of EU Member States. The Anglo-Saxon and Scandinavian countries, together with Germany and France, show the highest incidence of market-based finance, with indexes varying from 22% to 38%. This group can be extended to Benelux (Belgium, the Netherlands, and Luxembourg), where the indexes of market-based finance are between 15% and 20%, but still largely exceed those of bank-based finance. In the remaining old EA Member States, the incidence of market-based financial indexes remains between 10% and 15% and – with the exception of Spain and Portugal – is lower than that of bank-based indexes. This second group of countries also includes the new Member States from Central and Eastern Europe, where the market-based financial indexes fall below 10% or, in the case of Cyprus, Latvia, Estonia, Bulgaria and Romania, even below 5%. It is worth adding that the shares of bank-based finance on NFCs' total financial liabilities show a lower variability across countries than the corresponding shares of market-based finance. If we exclude the extreme values of Greece (26%) and Ireland (2%), the bank-based financial index will range from slightly less than 7% to 20%. Austria (20%), Italy (17%), and Germany (13%) are the old EA countries with the highest incidence of this latter index.

Figure 1: Market Share and Bank Share in 2019



Source: Our elaborations, based on Eurostat and ECB Statistical Datawarehouse

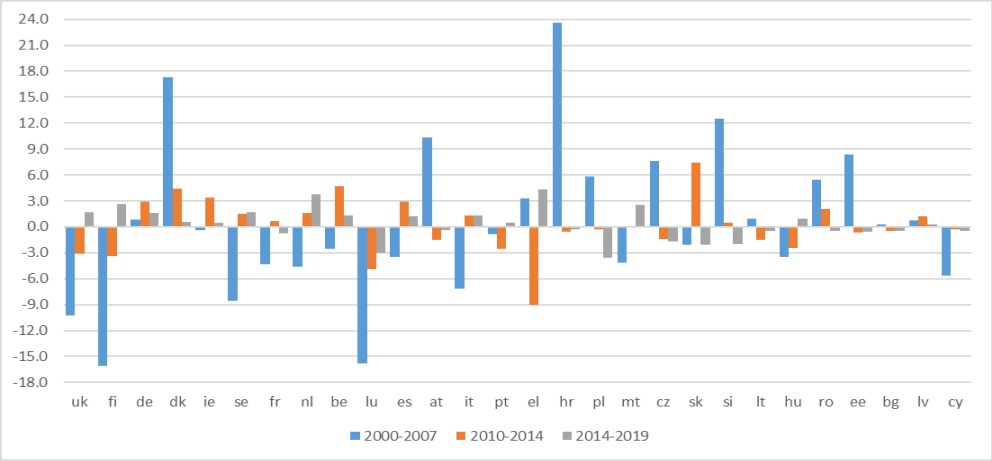
numerator of our two indexes has different explanations. In some cases, we were unable to classify heterogeneous assets with the same denomination; in other cases, we faced statistical problems.

The German (and Danish) cases highlight another interesting aspect. The two indexes under examination are negatively correlated by construction; however, differently from what is suggested by some of the theoretical literature (see Section 2), this negative correlation does not systematically apply to the distribution function between countries. In fact, leaving aside the two extremes of this distribution, it is not true that countries with high shares of market-based financial instruments are also the countries with low shares of bank-based instruments (or vice versa). In this respect, Germany is the most important example.

Figure 2 shows that the 2019 picture is not the result of a linear dynamic. The different EU countries did not follow a common and systematic trend in the varying shares of market-based finance during the three relatively homogeneous subperiods that articulate the years 1999-2019 before and after the global financial crisis (2008-2009): the expansionary phase (1999-2007), the EU and EA crises (2010-2013), and the recovery phase (2014-2018). On average, the market-based financial index fell between 1999 and 2007 with the significant exceptions of Denmark and Austria, the slight positive variation in Germany, and the partial upward adjustments from their very low initial incidences in some of the new Member States. During the first years that followed the global financial crisis, the majority of EA countries experienced increases in their market-based financial indexes (with the exception of Austria and Luxembourg as well as of the two countries under a European aid program, that is, Greece and Portugal); conversely, there were heterogeneous dynamics in the EU countries that started with a high value of this index (for instance, the UK and Finland with respect to Denmark and Sweden) and that recently became members. In the last phase (2014-2019), the average share of market-based finance slowly increased but in a more generalized way. This applies to most of the EA countries (with the exception of France and Luxembourg), to the Northern countries and to a few new Member States.

Our conclusion is that, after the global financial crisis, the majority of EU countries started to increase their shares of market-based finance with a slight average acceleration of this dynamic during the last sub-period (2014-2019). However, the general trend was not so uniform and so significant to comply with the efficiency criteria stated by the theoretical and empirical literature analyzed in Section 2.

Figure 2: Changes in the share of market-based finance, 1999-2007, 2010-2013, 2014-2019

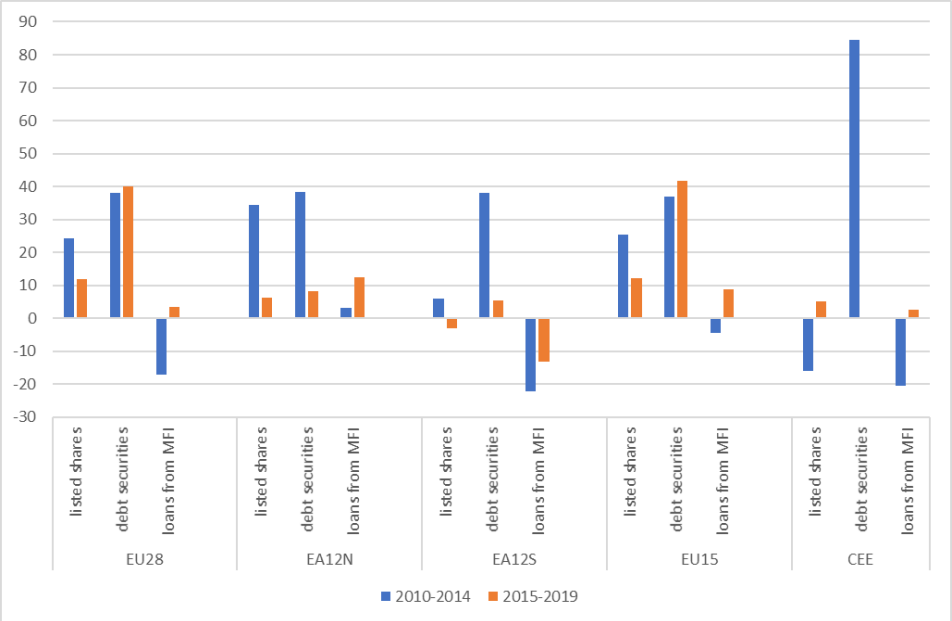


Source: Our elaborations, based on Eurostat and ECB Statistical Datawarehouse

As already mentioned, the mixed evidence obtained through the previous analysis could be due to the interference of a number of non-financial macroeconomic variables on the dynamics of the aggregate financial variables in the two heterogeneous macro-groups of the EU countries. Hence, it would be useful to refine our empirical description by looking at the composition of NFCs' financial liabilities in more homogeneous groups of countries (see Figure 3). This disaggregation allows for a more accurate identification of the components that drove the overall evolution of market-based and bank-based finance in four different groups of EU Member States during the two subperiods 2010-2014 and 2015-2018.

Figure 3 highlights that market-based finance recorded a faster cumulative dynamic relative to bank-based finance not only in the aggregate (that is, the whole EU: see EU28), but also in each of the four homogeneous subgroups of countries, that is, in the core (EA12N) and periphery (EA12S) of the EA as well as in the old (EU15) and new (CEE) sets of EU Member States not belonging to the EA.

Figure 3: Financial Sources of Non-Financial Corporations: cumulative changes

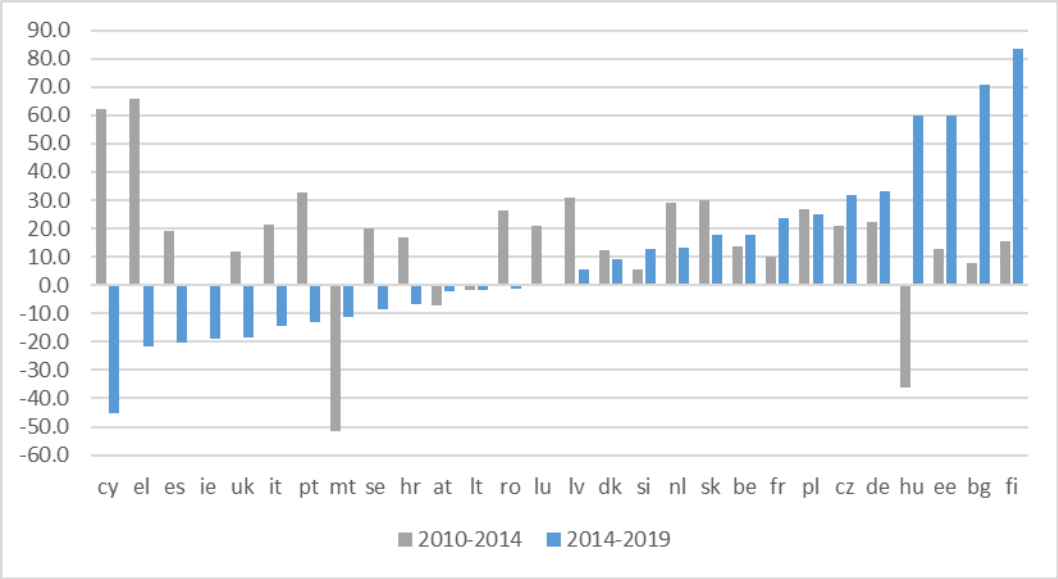


Source: Our elaborations, based on Eurostat and ECB Statistical Datawarehouse.

In each of these four subgroups of EU countries, the most important increases were recorded by debt securities. In the aggregate, this last component marked the cumulative positive changes of almost 40% in 2010-2014 and in 2015-2019.[15] These average results were due to an outstanding progress of debt securities in the CEE and to their significant and uniform increases in the other three subgroups during the 2010-2014 period, and mainly to their important positive changes in the EA15 during the 2015-2019 period. The listed equities also experienced a cumulative growth in the aggregate in both the subperiods examined. However, their dynamics followed a slower path than debt securities. Moreover, these dynamics were slowing down and were uneven among subgroups. In any case, the growth of market-based components dominated the cumulative changes in the bank-based finance. In the aggregate, the cumulative changes in MFI's loans fell during the first subperiod due to the credit crunch in the EA12S and CEE; and their negligible progress after 2014 was accompanied by a persistent fall in the EA12S.

[15] As pointed out by Schnabel (2021), it would be interesting to decompose debt securities in order to focus on corporate bonds. However, at this stage of our analysis, we decided to overlook this refinement.

Figure 4: Bank capitalization to GDP: changes in 2010-2014 and 2014-2019



Source: Our elaborations, based on Eurostat and ECB Statistical Datawarehouse

To better understand the possible causes of the negative changes and limited recovery in MFI's loans after 2010, it is important to separate the roles played by significant determinants on the demand and the supply side of loans. In this respect, we offer an example. One of the main constraints of the potential supply of bank loans is represented by the degree of bank capitalization. Here we refer to the simple index of the banking sector's capitalization over GDP for each of the EU countries (see Figure 4). In the subperiod 2010-2014, the large majority of these countries experienced moderate but positive changes in this index. After 2014, instead, the corresponding dynamic was uneven. The bank capitalization index increased substantially in many Northern countries (for instance, Finland, Germany, France, and The Netherlands) and in some Eastern countries (Hungary, Estonia, Bulgaria, the Czech Republic and Poland); however, there were heterogenous dynamics even inside the subgroups of EU15 (for instance, the UK) and CEE. On the other hand, the majority of the EA12S' components experienced a reduction in bank capitalization over GDP; however, this reduction was due to a number of idiosyncratic factors at the national level.

4. Empirical analysis: econometric strategy and main results

Let us sum up the results obtained in the previous section by means of our descriptive empirical analysis. The evidence indicates that the EU countries recorded significant increases in the share of market-based finance after the global financial crisis, especially in terms of the incidence of debt securities. Moreover, there was a generalized decreasing incidence of bank loans in the total financial liabilities of the NFCs

located in the various subgroups of EU Member States. This decrease was likely due to different factors: in some cases, to changes in the NFCs' demand for finance; in other cases, to supply factors (such as banks' deleveraging processes, reduction of banks' troubled assets, liquidation of NPLs). However, these trends were insufficient to overcome the widespread bank-based predominance in the major EA countries. Hence, our descriptive evidence leads to three conclusions: (i) despite the growing incidence of market-based finance, the EU and – mainly – the EA remain characterized by a bank-based financial structure or, at most, by an unstable combination of bank-based and market-based financial structures; (ii) this common macrotrend goes together with a persistent heterogeneity in the financial liabilities' composition of NFCs located in various European countries; (iii) the EU and EA Member States have not been able to exploit all the opportunities offered by an efficient financial structure.

These conclusions emphasize the importance of assessing whether, in any case, market-based finance provided a positive contribution to the performance of NFCs during the last two decades; and, given the post-crisis dynamics, whether the effects of the financial structure on NFCs' performance changed – and, more specifically, became stronger.

In the current and following sections, we provide a formal econometric test of the relations between financial structures and economic performance of NFCs, thus offering some evidence of the empirical inconsistency characterizing the 'neutrality view'. Economic performance is measured, alternatively, by Gross Value Added and Gross Fixed Capital Formation, with the latter further split into its main components.

4.1 Econometric strategy

We rely on a panel of the 28 EU Member States over the 1999-2019 period, and we perform the analysis by grouping European countries according to their involvement over time in the processes of European integration and of euro adoption. With respect to the Member States that were the founders or early participants in the European monetary union, we introduce a further distinction in two subgroups: northern/continental and southern/Mediterranean countries.[16] Hence, our classification is the following:

- EA28 includes all countries belonging to the EU until 2018, so that also the United Kingdom is a component of this subgroup.

[16] Although not perfect, European integration is based on institutional criteria that impose a certain convergence process on incumbents and new entrants. In any case, this integration reflects the historical paths which have common roots.

- EA12 includes all countries that joined the euro area in its early stages, i.e. the eleven EU Member States that adopted the euro in the beginning, along with Greece, which adopted the euro on January 1, 2001.
- EA12 is split into two subgroups, EA12N and EA12S, where EA12N includes the northern/ continental countries, i.e. Austria, Belgium, Finland, France, Germany, Ireland, Luxembourg, the Netherlands; and EA12S includes the southern/Mediterranean countries, i.e. Greece, Italy, Portugal, and Spain.
- EU15 includes Sweden, Denmark, the UK, and all the countries belonging to EA12.
- CEE includes countries joining the EU and/or the euro area in later stages: Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania Slovenia and Slovakia. Let us recall that, in the previous descriptive analysis, this subgroup was further split according to its possible Euro membership.

The estimated specifications are the following:

$$\Delta Y_{i,t} = \beta_0 + \beta_1 \Delta MarkShare_{i,t-1} + \beta_2 \Delta BankShare_{i,t-1} + \beta_3 Kap_{1,t-1} + \beta_4 X_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

$$\Delta Y_{i,t} = \beta_0 + \beta_1 \Delta MarkShare_{i,t-1} + \beta_2 \Delta BankShare_{i,t-1} + \beta_3 Kap_{i,t-1} + \beta_4 X_{i,t-1} + \beta_5 \Delta MarkShare_{i,t-1} * (T > 2009) + \theta_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

$$\Delta Y_{i,t} = \beta_0 + \beta_1 \Delta MarkShare_{i,t-1} + \beta_2 \Delta BankShare_{i,t-1} + \beta_3 Kap_{i,t-1} + \beta_4 X_{i,t-1} + \beta_5 BankShare_{i,t-1} * (T > 2009) + \theta_i + \gamma_t + \varepsilon_{i,t} \quad (3)$$

Equation (1) is our basic specification, whereby the performance indicator Y – alternatively Gross Value Added (*GVA*) or Gross Fixed Capital Formation (*Inv*) - is expressed as a function of the lagged changes in the share of market-based financial instruments on total financial liabilities ($\Delta MarkShare$) as well as of the lagged changes in the share of bank-based financial instruments on total financial liabilities ($\Delta BankShare$). Equation (1) also includes two additional control variables. The first control is aimed at assessing if and how the size of the banking sector, in terms of the relative shares of market- and bank-based finance, might be affected by changes in the potential amount of credit supply due to banks' deleveraging. To approximate this potential amount, we use capitalization of the banking sector over GDP (*Kap*) (see also Figure 4). The other control variable X is, alternatively, the lagged growth rate of NFCs' Gross Fixed Capital Formation (ΔInv) or the lagged growth rate of Gross Value Added (ΔGVA). With these second controls we try to deal with the potential linkages between investment and gross value added. More specifically, we introduce the former as regressor when the ΔGVA is the dependent variable;

and we do the opposite when the dependent variable is Δ*Inv*. Finally, we add a group of country- and time-specific fixed effects (θ_i and γ_t) to check for unobserved time invariant heterogeneity and cross-sectional dependence among panels.[17]

Equations (2) and (3) re-phrase equation (1) in order to test for a structural break in the effects of either *ΔMarkShare* (equation 2) or *ΔBankshare* (equation 3) on NFCs' performance. The rationale behind these tests is that the global financial crisis could have asymmetrically hit bank-based and market-based financial structures in the EU so that this same crisis could have strengthened or weakened the relative ability of one of these structures to provide financial services. If this asymmetric impact had occurred, from 2010 onwards, the consequence would have been a change in the relations between each type of financial structure and the NFCs' economic performance, as well as a change in the relative effectiveness of these financial structures on the NFCs' economic performance.

As previously anticipated, the three equations will be estimated alternatively on *ΔGVA and ΔInv*. To further investigate the role of the financial structure in selecting among different types of investment, we replicate the estimations replacing *ΔInv* with its various components: Intellectual Property Products (*InvIPP*); Construction (*InvConstr*); Information & Communications Technology (*InvICT*); and Machinery, Equipment and Weapons Systems (*InvM&E*). According to the literature analysed above, we should expect the market-based financial structure to be more effective in stimulating innovative investments like *IPP* (which also includes R&D) and *ICT* compared to Construction and other Machinery and Equipment. Note that all regressors are introduced with a time lag in order to check – at least partially – for reverse causality and for other endogeneity issues.

Let us emphasize that lagged coefficients in OLS models are unbiased but potentially inconsistent due to weak endogeneity problems. Thus, to better address endogeneity issues in equations (1) - (3), we use a Panel VAR approach (Love and Zecchino, 2006) whereby each of the variables in equation (1) is expressed as a function of the other variables and its own lag. This PVAR leads to a system of dynamic equations linked though the error terms. The formal representation of the PVAR for equation (1) is the following:

[17] Due to the small size of the sample, in the estimation of the PVAR model we do not introduce additional standard controls in cross country growth regressions. To show that this choice has no impact on the main results, Tables A1 and A2 in the Appendix report Fixed Effects estimates of equations (1) - (3) augmented with the inflation rate (*Hicprate)*, the change in trade opening (Δ*Tradeop*) (defined as the average between import and export on GDP), and the change in the schooling rate (*ΔSchooling*).

$$\begin{cases} \Delta GVA_{i,t} = \beta_0 \Delta GVA_{i,t-1} + \beta_1 \Delta MarkShare_{i,t-1} + \beta_2 \Delta BankShare_{i,t-1} + \beta_3 \Delta Kap_{i,t-1} + \beta_4 \Delta Inv_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t,1} \\ \Delta MarkShare_{i,t} = \beta_6 \Delta MarkShare_{i,t-1} + \beta_7 \Delta GVA_{i,t-1} + \beta_8 \Delta BankShare_{i,t-1} + \beta_9 Kap_{i,t-1} + \beta_{10} \Delta Inv_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t,2} \\ \Delta BankShare_{i,t} = \beta_{12} \Delta BankShare_{i,t-1} + \beta_{13} \Delta GVA_{i,t-1} + \beta_{14} \Delta BankShare_{i,t-1} + \beta_{15} Kap_{i,t-1} + \beta_{17} \Delta Inv_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t} \\ \Delta Kap_{i,t} = \beta_{14} Kap_{i,t-1} + \beta_{15} \Delta GVA_{i,t-1} + \beta_{16} \Delta MarkShare_{i,t-1} + \beta_{17} \Delta BankShare_{i,t-1} + \beta_{19} \Delta Inv_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t,4} \\ \Delta Inv_{i,t} = \beta_{26} Inv_{i,t_{i,t-1}} + \beta_{27} \Delta GVA_{i,t-1} + \beta_{28} \Delta MarkShare_{i,t-1} + \beta_{29} \Delta BankShare_{i,t-1} + \beta_{31} \Delta Inv_{i,t-1} + \theta_i + \gamma_t + \varepsilon_{i,t,6} \end{cases}$$

Each equation in the system is estimated though a GMM approach using the first two lags as instruments. This procedure allows for the control for endogeneity due to omitted variables and measurement errors, whereas the system specification takes into account the feedback loops (reverse causality) among regressors. More specifically, although PVAR coefficients are estimates of instantaneous responses, they allow for calculating the Impulse Response Functions (IRF) representing the time profile of the real causal effect of a shock in either Δ*MarkShare* or Δ*BankShare*. Exogeneity is imposed though the standard Cholesky decomposition, which assumes that a shock in any of the two shares affects the economic performance with a lag. IRFs show the time profile of the performance variable's response, while the specific contribution of each share in explaining the variability of the economic performance is assessed though a Forward Error Variance Decomposition (FEVD).

Data for the empirical analysis are gathered from different sources. Data on trade openness, Gross Value Added and inflation rates are collected from Eurostat. Data on schooling are made available by the International Labour Organization (ILO). *Markshare* and *Kap*, calculated as described above, are based on data from Eurostat and the ECB Statistical Datawarehouse. Finally, data for NFCs' *Inv* are collected from Eurostat and EUKLEMS. We identify NFCs as the firms operating in the market economy, but we exclude real estate and financial sectors. We link the series from these two sources using growth rates.

4.2 Results for GVA and Inv

The first dependent variable here analysed is the Gross Value Added (*GVA*) of NFCs. Fixed effects (FE) estimates on *GVA* are shown in Table 1. The first five columns of this Table refer to the baseline specification represented by equation (1); columns 6-10 refer to the specification represented by equation (2), which introduces a structural break for Δ*Markshare* following the global financial crisis ($\Delta MarkShare_{t-1}$(T>2009)); columns 11-15 refer to the specification represented by equation (3), which analyses a structural break for Δ*BankShare* from 2010 onwards ($\Delta BankShare_{t-1}$ (T>2009)). For each specification, we show the results for the whole EU and for the four subgroups identified in the previous subsection.

The results show that Δ*Marketshare* is positive in all samples, but it is significant only for the EU28, for the EU15 and for the EA12S. Neither Δ*BankShare* nor Δ*Kap* are significant while *ΔInv* is significant for CEE only, a result which might denote the importance of investments in that subgroup to fill the gap with the other European countries. The structural break in *ΔMarkShare* shows that, for EA12S, the relation between the financial structure and growth is significant only after the global financial crisis. Finally, equation (3) shows that changes in *Bankshare* are negatively related to changes in *GVA* growth. Even though this result might be driven by deleveraging in the banking sector and by a falling demand for loans in the NFCs sector, it shows that reducing dependence on bank credit is beneficial to growth.

Turning to PVAR estimates, the results are shown in Table 2. Estimates of the basic specification (1) confirm the significant and positive impact of Δ*MarkShare* on *ΔGVA* with almost identical patterns in each of the subgroups. According to the estimated coefficients which represent consistent estimates of the simultaneous impact, *ΔMarkShare* has a significant and positive impact in all samples except for CEE; conversely, the negative signs of *ΔBankShare* are never significant. The only important difference with FE estimates should be found in the effect of bank capitalization (*Δ*Kap): this last variable is negative and significant in all samples except for EA12S. Columns 6-10 and 11-15 show, respectively, the PVAR equivalent of equations (2) and (3). The only difference is the interpretation of post-break coefficients: differently from FE estimates, the post-break coefficient represents the actual effect over the period and not the difference with respect to the pre-crisis impact.[18] Even in this case, the results strengthen the previous findings. The effect of Δ*MarkShare* is positive and significant throughout the whole period in the EU28 and in the EU15, while the positive effect is detected only after the global financial crisis in EA12S and CEE. At the same time, results for equation (3) confirm the negative impact of Δ*BankShare* after the crisis. This result holds for all the subgroups except for EA12N, where the bank share does not have a significant impact before or after the crisis.

Moving to the results of the other dependent variable, i.e. *Inv*, Table 3 shows FE estimates of equations (1) - (3). The structure of this last table follows exactly that of Tables 1 and 2. The size of the banking sector (*ΔKap*) is significant and negative in the EU28, EU15 and CEE, while lagged *GVA* growth is significant in the EU28, EU15 and EA12N. Regarding our financial indexes, *ΔMarkShare* is always positive in equation (1) but significant only in EU28, EU15 and EA12N; conversely, *ΔBankShare* is negative for EU15 and for EA12S. As for equation (2), *ΔMarkShare* becomes significant in most cases

[18] This different representation is performed to better identify shocks in the Impulse Response Analysis.

after the global financial crisis, especially for EA12S and CEE. Finally, estimates of equation (3) indicate that increases in *ΔBankShare* are negatively related to gross investment growth in all regions except for EA12N.

Panel VAR's estimates on total investment growth confirm the previous results only partially (see Table 4). Referring to equation (1*),* it turns out that *MarkShare* changes are positive but never significant; however, as stated by equation (2), these same changes become significant after the global financial crisis. As for *ΔBankShare*, its negative impact is generally confirmed; moreover, estimates of equation (3) show that this negative impact applies especially after the global financial crisis. In this specification, *ΔMarkShare* is significant in most groups, in line with FE estimates.

As a final step, we examine the estimates on the different *Inv* components for the EU28 (cf. Table 5). We do not show estimates in the four specific subgroups, as missing data would excessively reduce the size of the sample especially for EA12S and CEE. Hence, with reference to EU28, in the PVAR, model estimates of equation (1) (upper panel) indicate that the effect of *ΔMarkShare* is positive and significant for *InvConstr*, while it is negative and significant for *InvIPP*. In FE estimates, these variables are never significant, although signs are in line with PVAR estimates. As for *ΔBankShare,* the results suggest that its negative impact is concentrated in *InvM&E* and in *InvIPP*. The structural break in *ΔMarkShare* (lower panel) shows opposite results for FE compared to PVAR estimates. The FE estimates suggest that the positive impact of *ΔMarkShare* on *Inv* after the crisis is concentrated in *InvM&E* and in *InvConstr*, while the PVAR estimates show a negative coefficient for all assets.

To sum up, our econometric findings show the positive impact of the increasing incidence of market-based finance on the growth of NFCs' value added, especially after the global financial crisis. The EA's southern countries (EA12S) and the EU central-eastern countries (CEE) are the subgroups where this impact was the strongest. In addition, in these same subgroups, the increasing incidence of market-based finance became particularly effective in stimulating investments, especially after the global

Table 1: Fixed effects on GVA

	EU28	EU15	EA12N	EA12S	CEE	EU28	EU15	EA12N	EA12S	CEE	EU28	EU15	EA12N	EA12S	CEE
ΔKAP_{t-1}	-0.194	-0.221	-0.256	-0.13	0.179	-0.196	-0.223	-0.261	-0.114	0.146	-0.185	-0.220	-0.269	-0.093	0.164
	[0.137]	[0.139]	[0.205]	[0.159]	[0.141]	[0.137]	[0.140]	[0.212]	[0.153]	[0.183]	[0.143]	[0.145]	[0.211]	[0.133]	[0.145]
ΔlnGFCF	0.033	0.000	-0.049	0.031	0.108**	0.031	-0.002	-0.052	0.03	0.106*	0.029	-0.006	-0.055	0.023	0.116*
	[0.025]	[0.031]	[0.034]	[0.039]	[0.028]	[0.025]	[0.029]	[0.035]	[0.041]	[0.032]	[0.025]	[0.029]	[0.035]	[0.046]	[0.036]
$\Delta MarkShare_{t-1}$	0.234**	0.249**	0.158	0.389*	0.348	0.199*	0.227***	0.147	0.233	0.316	0.211**	0.227***	0.169*	0.300	0.411
	[0.072]	[0.063]	[0.085]	[0.149]	[0.198]	[0.072]	[0.050]	[0.097]	[0.132]	[0.278]	[0.058]	[0.046]	[0.076]	[0.152]	[0.224]
$\Delta BankShare_{t-1}$	-0.108	-0.18	-0.435	0.011	0.068	-0.084	-0.162	-0.433	0.029	0.062	0.19	0.048	-0.23	0.197	1.304
	[0.130]	[0.132]	[0.321]	[0.110]	[0.268]	[0.150]	[0.151]	[0.326]	[0.115]	[0.286]	[0.212]	[0.175]	[0.278]	[0.127]	[0.782]
$\Delta MarkShare_{t-1}$(T>2009)						0.167	0.111	0.122	0.284*	0.212					
						[0.201]	[0.159]	[0.304]	[0.061]	[0.569]					
$\Delta BankShare_{t-1}$ (T>2009)											-0.611**	-0.463***	-0.602*	-0.419*	-1.875*
											[0.196]	[0.097]	[0.188]	[0.077]	[0.957]
N	328	237	143	73	91	328	237	143	73	91	328	237	143	73	91
R-sq	0.888	0.473	0.46	0.679	0.968	0.888	0.474	0.461	0.685	0.968	0.891	0.485	0.466	0.7	0.97

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level

Table 2: GMM Panel VAR estimates on GVA

	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE
$\Delta lnGVA_{t-1}$	0.078	0.131	-0.11	0.427***	-0.114	0.04	0.14	-0.034	0.421***	0.012	-0.004	0.085	-0.05	0.355***	-0.301***
	[0.078]	[0.105]	[0.090]	[0.080]	[0.116]	[0.072]	[0.089]	[0.089]	[0.113]	[0.098]	[0.072]	[0.098]	[0.081]	[0.085]	[0.082]
$\Delta lnGFCF_{t-1}$	0.013	0.007	-0.012	-0.013	0.039	0.026	0.002	-0.031	-0.002	0.039	0.033	0.008	-0.013	-0.029	0.073*
	[0.024]	[0.024]	[0.025]	[0.031]	[0.043]	[0.024]	[0.023]	[0.026]	[0.034]	[0.035]	[0.021]	[0.021]	[0.020]	[0.030]	[0.030]
$\Delta MarkShare_{t-1}$	0.284***	0.304***	0.151*	0.307**	0.184	0.224**	0.237***	0.145*	0.055	0.228	0.243***	0.230***	0.151*	0.204**	-0.075
	[0.066]	[0.069]	[0.065]	[0.101]	[0.153]	[0.070]	[0.066]	[0.065]	[0.173]	[0.152]	[0.066]	[0.065]	[0.059]	[0.075]	[0.168]
$\Delta BankShare_{t-1}$	-0.107	-0.091	-0.085	-0.065	-0.44	-0.083	-0.126	-0.165	-0.038	-0.203	0.175	0.13	-0.139	0.289*	-0.395
	[0.123]	[0.127]	[0.196]	[0.055]	[0.411]	[0.122]	[0.135]	[0.168]	[0.142]	[0.359]	[0.118]	[0.105]	[0.206]	[0.143]	[0.575]
$\Delta MarkShare_{t-1}$(T>2009)						0.511**	0.395*	0.073	0.707**	0.621*					
						[0.189]	[0.200]	[0.233]	[0.241]	[0.328]					
$\Delta BankShare_{t-1}$ (T>2009)											-0.444**	-0.331*	0.061	-0.464***	-2.175***
											[0.159]	[0.153]	[0.245]	[0.073]	[0.446]
ΔKAP_{t-1}	-0.214*	-0.204*	-0.255***	0.027	-0.392*	-0.212*	-0.223**	-0.249***	0.06	-0.342**	-0.207*	-0.199*	-0.250***	-0.038	-0.257*
	[0.093]	[0.083]	[0.069]	[0.065]	[0.158]	[0.090]	[0.081]	[0.050]	[0.066]	[0.128]	[0.090]	[0.079]	[0.051]	[0.047]	[0.110]
Hansen	21.7	15.7	24.6	27.5	28.7	29.2	31.5	28.4	32.7	38.5	34.7	29.7	39.3	37.4	41.3
N	302	219	133	68	83	302	219	133	68	83	302	219	133	68	83

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level.

Table 3: Fixed effects – total investment

	EU28	EU15	EA12N	EA12S	CEE	EU28	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE
ΔKAP_{t-1}	-0.477*	-0.331*	-0.3	0.179	-1.557*	-0.468*	-0.332*	-0.307	0.263	-2.215**	-0.473*	-0.345*	-0.294	0.287	-1.757*
	[0.186]	[0.113]	[0.176]	[0.270]	[0.766]	[0.206]	[0.125]	[0.202]	[0.271]	[0.627]	[0.214]	[0.127]	[0.197]	[0.284]	[0.667]
ΔlnGVA	0.433*	0.796**	1.016**	0.339	0.064	0.392	0.760**	1.002**	0.204	0.055	0.348	0.720**	1.024**	0.001	-0.03
	[0.227]	[0.228]	[0.271]	[0.468]	[0.221]	[0.229]	[0.245]	[0.282]	[0.412]	[0.224]	[0.238]	[0.239]	[0.282]	[0.387]	[0.300]
$\Delta MarkShare_{t-1}$	0.484*	0.442*	0.581*	0.649	1.416	0.13	0.283	0.503	-0.268	0.615	0.399*	0.377*	0.576*	0.379	1.617*
	[0.242]	[0.209]	[0.279]	[0.282]	[0.843]	[0.285]	[0.291]	[0.284]	[0.436]	[0.669]	[0.206]	[0.196]	[0.285]	[0.276]	[0.490]
$\Delta BankShare_{t-1}$	-0.337	-0.728**	0.005	-0.531*	0.776	-0.172	-0.643**	0.009	-0.409*	0.789	0.586	-0.194	-0.086	0.237	5.312**
	[0.317]	[0.183]	[0.791]	[0.188]	[0.896]	[0.306]	[0.183]	[0.803]	[0.167]	[1.132]	[0.483]	[0.233]	[0.459]	[0.338]	[1.248]
$\Delta MarkShare_{t-1}$(T>2009)						1.319*	0.584	0.515	1.747*	5.065**					
						[0.547]	[0.473]	[1.285]	[0.338]	[0.963]					
$\Delta BankShare_{t-1}$(T>2009)											-1.936**	-1.106**	0.270	-1.688*	-7.211**
											[0.635]	[0.327]	[1.832]	[0.516]	[1.409]
N	340	242	148	73	98	340	242	148	73	98	340	242	148	73	98
R-sq	0.396	0.418	0.429	0.657	0.615	0.41	0.422	0.431	0.688	0.66	0.418	0.429	0.429	0.699	0.66

Standard errors in brackets. *significant at 10% level; **significant at 5% level; ***significant at 1% level.

Table 4: GMM Panel VAR estimates on total investment

	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE
$\Delta lnGVA_{t-1}$	0.509**	0.866***	1.161***	0.796**	-0.926*	0.513**	0.913***	1.303***	0.915***	-0.222	0.394*	0.796***	1.155***	0.181	-1.703***
	[0.186]	[0.196]	[0.200]	[0.289]	[0.398]	[0.174]	[0.174]	[0.183]	[0.256]	[0.319]	[0.193]	[0.189]	[0.155]	[0.280]	[0.384]
$\Delta lnGFCF_{t-1}$	-0.033	0.044	-0.069	0.074	0.127	-0.045	-0.019	-0.142*	0.063	0.086	-0.038	0.023	-0.045	0.190*	0.192
	[0.067]	[0.068]	[0.082]	[0.108]	[0.131]	[0.069]	[0.070]	[0.085]	[0.096]	[0.130]	[0.062]	[0.062]	[0.069]	[0.089]	[0.139]
$\Delta MarkShare_{t-1}$	0.318	0.352	0.118	0.484	2.068***	-0.054	0.168	0.231	-0.894*	0.585	0.149	0.219	0.046	0.411	1.331*
	[0.239]	[0.215]	[0.188]	[0.393]	[0.577]	[0.217]	[0.199]	[0.191]	[0.375]	[0.451]	[0.205]	[0.175]	[0.158]	[0.337]	[0.519]
$\Delta BankShare_{t-1}$	-0.694*	-0.581	0.199	-0.429*	-1.945	-0.691*	-0.442	0.553	-0.612*	0.63	0.074	0.349	1.256**	0.612***	5.916***
	[0.421]	[0.372]	[0.511]	[0.243]	[1.936]	[0.417]	[0.322]	[0.524]	[0.289]	[1.222]	[0.419]	[0.235]	[0.447]	[0.143]	[1.598]
$\Delta MarkShare_{t-1}$(T>2009)						1.232*	1.042	-0.428	2.024**	9.852***					
						[0.677]	[0.744]	[0.546]	[0.624]	[2.032]					
$\Delta BankShare_{t-1}$ (T>2009)											-3.040***	-1.317**	-0.783	-1.602***	-13.407***
											[0.848]	[0.438]	[0.630]	[0.277]	[3.104]
ΔKAP_{t-1}	-0.835***	-0.552**	-0.731***	0.2	-3.547***	-0.904***	-0.453**	-0.638***	0.362*	-3.100***	-0.802***	-0.446**	-0.625***	0.151	-2.722***
	[0.196]	[0.178]	[0.161]	[0.153]	[0.684]	[0.178]	[0.162]	[0.137]	[0.167]	[0.576]	[0.186]	[0.148]	[0.111]	[0.129]	[0.580]
Hansen	21.7	15.7	24.6	27.5	28.7	29.2	31.5	28.4	32.7	38.5	34.7	29.7	39.3	37.4	41.3
N	302	219	133	68	83	302	219	133	68	83	302	219	133	68	83

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level.

Table 5: Fixed Effects and GMM-Panel VAR estimates by asset type

	Fixed Effects				GMM-PVAR			
	M&E	Constructions	ICT	IPP	M&E	Constructions	ICT	IPP
$\Delta lnGFCF_{t-1}$					-0.048	-0.02	-0.194*	-0.186*
					[0.060]	[0.086]	[0.105]	[0.094]
$\Delta lnGVA_{t-1}$	0.225	0.460*	0.63	0.136	0.306	0.720**	0.462	0.374
	[0.198]	[0.229]	[0.859]	[0.388]	[0.189]	[0.267]	[0.518]	[0.342]
$\Delta MarkShare_{t-1}$	0.381	0.692	0.628	-0.412	0.232	0.853**	0.175	-0.999**
	[0.363]	[0.445]	[0.974]	[0.266]	[0.326]	[0.309]	[0.524]	[0.348]
$\Delta BankShare_{t-1}$	-0.829*	0.187	-1.324*	-0.662	-1.117**	-0.201	-1.352	-1.556***
	[0.449]	[0.319]	[0.729]	[0.460]	[0.430]	[0.732]	[1.080]	[0.388]
ΔKAP_{t-1}	-0.112	0.150	0.137	-0.893*	-0.31	0.164	0.700*	-1.634***
	[0.113]	[0.193]	[0.540]	[0.463]	[0.200]	[0.193]	[0.305]	[0.395]
Hansen					27.2	27.8	17.7	25.3
R-sq	0.446	0.185	0.087	0.134				
N	340	276	254	325	302	250	224	289
	Fixed Effects				GMM-PVAR			
	M&E	Constructions	ICT	IPP	M&E	Constructions	ICT	IPP
ΔlnGFCFt-1					-0.045*	0.011	0.014*	0.014
					[0.018]	[0.017]	[0.007]	[0.012]
$\Delta lnGVA_{t-1}$	0.206	0.343*	0.641	0.117	0.049	-0.021	-0.018	-0.016
	[0.196]	[0.188]	[0.872]	[0.406]	[0.056]	[0.081]	[0.053]	[0.058]
$\Delta MarkShare_{t-1}(t<2010)$	0.218	0.133	0.766	-0.529	-0.004	-0.036	-0.157	0.011
	[0.439]	[0.376]	[1.131]	[0.376]	[0.117]	[0.107]	[0.139]	[0.124]
$\Delta MarkShare_{t-1}(t>2009)$	0.826*	2.350**	-0.037	-0.056	-0.732**	-0.498*	-0.059	-0.491*
	[0.417]	[0.607]	[1.572]	[0.413]	[0.270]	[0.276]	[0.334]	[0.268]
$\Delta BankShare_{t-1}$	-0.753*	0.484	-1.330*	-0.595	-0.081	-0.186	-0.29	-0.083
	[0.405]	[0.405]	[0.748]	[0.463]	[0.127]	[0.129]	[0.193]	[0.119]
ΔKAP_{t-1}	-0.108	0.149	0.138	-0.888*	0.455***	0.401***	0.368***	0.431***
	[0.118]	[0.216]	[0.548]	[0.469]	[0.086]	[0.098]	[0.094]	[0.103]
Hansen					27.8	29.1	18.5	23.3
R-sq	0.449	0.22	0.088	0.135				

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level

financial crisis. Conversely, in the EA's northern countries (EA12N), it appears that changes in the financial structure did not produce significant effects on investment; in fact, in this subgroup, investment seems to be mainly driven by the previous *GVA* growth. Despite this last piece of evidence, our econometric findings indicate that bank-based finance had negative consequences on *GVA* and investment growth in the EU28, especially after the global financial crisis. As we have already stated, this result is partly due to the negative correlation between *BankShare* and *MarkShare*. However, another possible explanation is that banks tend to perform worse than markets in allocating financial resources, especially during economic crises (Schivardi et al., 2019).

The estimates presented in this section do not fully address the endogeneity issue as they fail to capture the time profile of the impact of the financial structure on NFCs' performance. This effect might

be particularly important in investment equations, as shown by the large differences in estimated coefficients between FE and PVAR regressions, and might explain the unexpected results in particular with respect to innovative vs traditional components.[19] It is important to stress this point because we will take this problem into account by estimating the Impulse Response Functions in the next section.

5. A robustness check of the econometric exercise

To provide a more robust assessment of the causal link between either Δ*MarkShare* or Δ*BankShare*, on the one hand, and Δ*GVA* or Δ*Inv*, on the other, we calculate Impulse Response Functions (IRFs) describing the time profile of the responses implemented by each of the performance variables following an exogenous shock in each of the two financial structures. The identification is based on the Cholesky decomposition.[20] Figures 5 – 7 show IRFs for the whole EU28, while IRFs for each of the four subgroups are shown in the Appendix.

We start with equation (1) that separately analyses the effect of Δ*MarkShare* and Δ*BankShare* on the two dependent variables. As far as Δ*MarkShare* is concerned, IRFs are in line with the estimated coefficients as they show a positive response of both *GVA* and *Inv* growth. However, it is interesting to note that the positive response is stronger for *Inv* than for *GVA* (Figure 5). The positive effect in terms of growth of the latter dependent variable is concentrated in the first period after the shock, while the response of *Inv* growth remains positive and significant for two periods after the shock. As far as Δ*BankShare* is concerned, the instantaneous responses of both *GVA* and *Inv* are negative and significant but they fade to zero in the following period. Moving to equation (2), Figure 6 shows that the response of *GVA* to a shock in *MarkShare* is positive but does not change substantially after the global financial crisis; instead, the response of *Inv* becomes significant only after the break in 2009. Starting from the shock-year, the effect on *Inv* already becomes positive and significant in that same year, and it remains significant for the following two periods, reaching the maximum one year after the shock. When the break is imposed on Δ*BankShare* (Figure 7), the negative impact of the shock in this independent variable towards *GVA and Inv* is concentrated in the post-crisis period. This is, again, in line with estimated coefficients.

Analogous results are obtained by shortly moving to the four different sub-groups (see Figures A5 - A8 in the Appendix). IRFs indicate that the positive response of *GVA* to an increasing incidence in

[19] An additional explanation could lie in the low and highly heterogeneous share of ICT and R&D investment.
[20] The direction of causality is ➔Kap➔MarkShare/BankShare ➔GVA/INV. However, the results are mostly unaffected by the variables' ordering.

Δ*MarkShare* is limited to the EU15 subgroup and, more specifically, to the EA12S subgroup. The positive response *of Inv* to the increasing incidence in Δ*MarkShare* is concentrated after the global financial crisis and refers to these same subgroups but also to the CEE.

Looking at the different components of *Inv*, Figures A1 - A4 in the Appendix show the IRFs for each of the four components previously analysed (*InvConstr*, *InvICT*, *InvIPP*, and *InvM&E*). Let us just focus on equation (2), which offers the most informative specification. As in the corresponding case of FE and PVAR estimates, the econometric evidence does not perfectly fit with the theoretical expectations. In fact, a positive and significant response to a change in the share of market-based finance is found for *InvM&E* and mainly for *InvConstr*, but not for *InvICT* and *InvIPP*; in the case of these last two components, the responses to a shock in Δ*MarkShare* are not significant. However, in accordance with the theoretical findings, *InvICT* and mainly *InvIPP* record negative responses to a shock determining Δ*BankShare* (see Figure A4).

In the light of the above considerations, it is now possible to provide a quantitative assessment of the explanatory power of our model. Table 8 shows the Forecast Error Variance Decompositions (FEVD) indicating the fraction of the variance of *GVA* growth and *Inv* growth, respectively explained by shocks determining Δ*MarkShare* and Δ*BankShare*. Let us relate FEVD to equation (1). For the EU28, a shock determining *ΔMarkShare* explains 4.2% of *ΔGVA*'s forecast error variance and 2.4% of *ΔInv* 's forecast error variance. The corresponding percentages explained by a shock determining Δ*BankShare* are, respectively, 2.5% and 3.8%. In the EU15 and in the EA12S, the variability of *ΔGVA* explained by Δ*MarkShare* increases to almost 6% and to more than 20%, respectively. In the EA12N and CEE, the variability of *ΔGVA* explained by Δ*BankShare* increases to 5% and to more than 22%, respectively (see columns 1 and 2 of the same table). As for the variability of investment growth (see columns 3 and 4 of the same table), a shock determining Δ*MarkShare* explains – respectively – almost 5%, almost 5.5%, and largely more than 24% of the variability of *ΔInv* in these three subgroups: EU15, CEE, and EA12S. Finally, a shock determining Δ*BankShare* explains, respectively, 6% and almost 13% of the variability of *ΔInv* in the subgroups EA12N and CEE.

Referring to the specification with a break in Δ*MarkShare* (Table 8, lower panel), the explained forecast error variance after the global financial crisis increases to 7.9% for *ΔGVA* and to 9.6% for *ΔInv*. As for the subgroups, EA12S shows the higher shares of explained variability for both *ΔGVA* and *ΔInv*. For the former dependent variable, these shares reach 10.7% before the global financial crisis and 37.5% after this crisis. For the latter dependent variable, these same shares reach 4.6% before the global financial

crisis and 45.1% after this crisis. The EU15 and CEE subgroups follow similar patterns, even if these patterns are less pronounced.

Figure 5: Responses of ΔGVA and ΔGFCF to shocks in ΔMarkShare and ΔBankShare

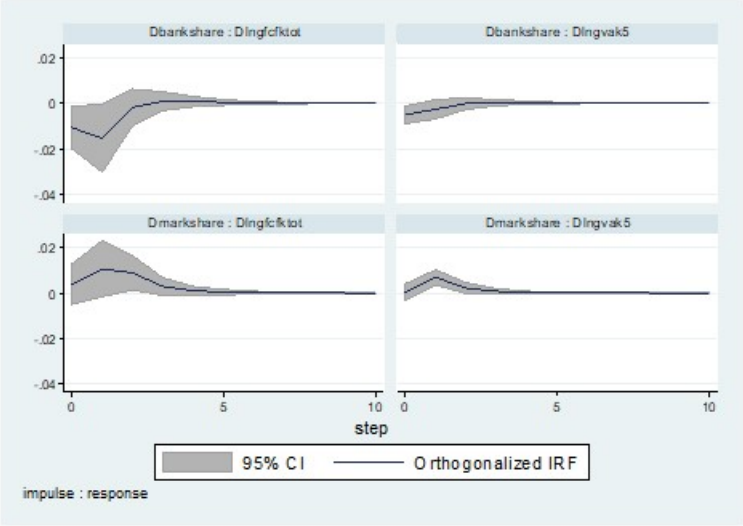


Figure 6: Responses of ΔGVA and ΔGFCF to shocks in *ΔMarkShare* and *ΔBankShare*: specification with break in *ΔMarkShare*

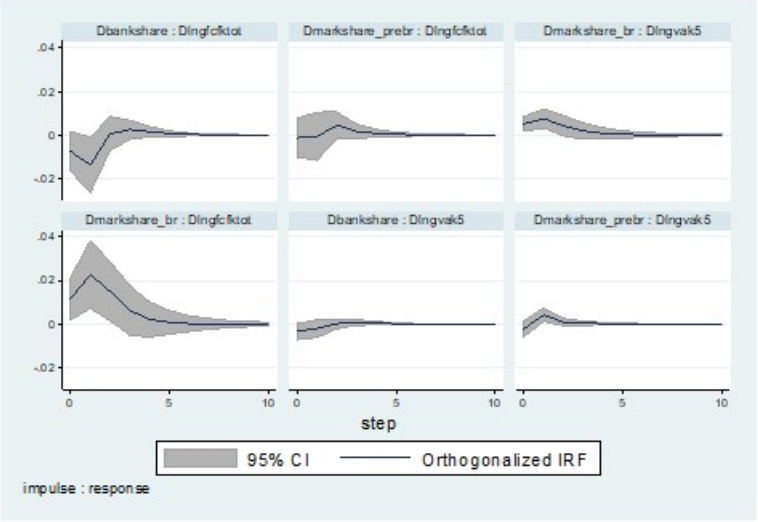


Figure 7: Responses of ΔGVA and ΔGFCF to shocks in *ΔMarkShare* and *ΔBankShare*: specification with break in *ΔBankShare*

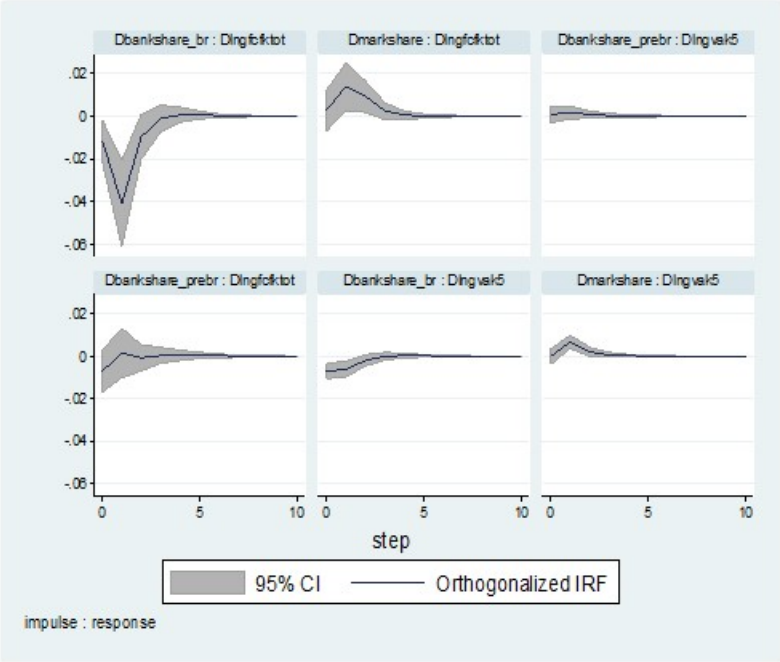


Table 8 Forecast Error Variance Decomposition

	No break					
	ΔGVA			ΔINV		
	ΔMarkShare		ΔBankShare	ΔMarkShare		ΔBankShare
EU28	4.2%		2.5%	2.4%		3.8%
EU15	5.9%		1.1%	4.9%		2.8%
EA12N	1.9%		5.0%	3.0%		6.0%
EA12S	20.1%		2.3%	24.3%		0.4%
CEE	2.1%		22.3%	5.4%		12.8%
	Break in market share					
	ΔGVA			ΔINV		
	ΔMarkShare (<2010)	ΔMarkShare (>2009)	ΔBankShare	ΔMarkShare (<2010)	ΔMarkShare (>2009)	ΔBankShare
EU28	1.9%	7.9%	1.2%	0.3%	9.6%	2.7%
EU15	2.3%	8.6%	1.5%	0.8%	12.4%	0.8%
EA12N	2.7%	0.6%	0.9%	0.8%	2.0%	1.3%
EA12S	10.7%	37.5%	0.7%	4.6%	45.1%	4.3%
CEE	1.8%	3.2%	19.7%	0.1%	25.2%	11.2%

Source: Our own elaboration

6. Conclusions

In this paper, we offer descriptive and econometric evidence of the relations between the structure of the financial markets and the economic performance in different groups of EU countries. Our exercise covers a long period, roughly coinciding with the euro's existence. Hence, the empirical analysis refers to pre- and post-2008 crisis periods and to the related long economic cycle. In our econometric analyses we explore the main financial channels highlighted in the literature to explain how the structure of the financial market can impact economic growth. In this respect, we focus on the importance of market-based financial instruments and we assess the relative performance of market-based financial systems with respect to bank-based financial systems. To this aim, we utilize two indexes that measure, respectively, the share of market-based finance and of bank-credit finance over the total amount of financial liabilities held by the industrial components of the European production system.

According to our estimates, the 'neutrality view' is not consistent with the empirical evidence, as the share of market-based finance appears to be a positive determinant of both *GVA* and *Inv* growth in the EU28. The importance of this financial variable has increased after the global financial crisis, so that it was able to explain almost 10% of the variability of the two performance indicators (that is, ΔGVA and ΔInv) before the pandemic shock. In terms of investment components, these results seem to be driven by investments in Machinery & Equipment and in Constructions; conversely, in contrast with the prevailing theoretical predictions, no clear patterns emerge for investments in ICT and IPP. The results relating to *GVA* growth are common in the main part of the EU subgroups; those relating to *Inv* growth are more uneven. However, it is worth noting that the increased importance of market-based finance for achieving good performance in terms of net value and investments of industrial firms (NFCs) specifically applies to the subgroup of southern EA Member States.

The resulting picture stresses the positive role that can be played by market-based finance in stimulating the growth of NFCs in the EU and, in particular, in the weakest countries of the EA. This empirical finding is in line with the most recent contributions documenting the dominant performance of market-based finance in supporting innovative investments (Gambacorta et al, 2014; Pagano et al, 2014, Langfield and Pagano, 2015, Levine et al. 2015). Furthermore, it confirms the theoretical expectation for a stronger role of market-based finance in stimulating economic growth and investment in countries highly dependent on bank credit (Acemoglu and Zilibotti, 1999; Demigurc-Kunt et al., 2011).

Our results suggest the need to pursue a new balance between the working of more articulated financial markets and the role of intermediaries in the EU. In several European countries, banks still

enjoy strong information advantages, robust customer relationships, and the widest supply of financial services. Hence, the articulation of the European financial markets requires the active cooperation of the banking sector. This is the reason why the growing role of the market-based financial structure should be combined with the evolution and the strengthening of an efficient bank-based financial structure. In the EA, it is necessary to shape financial markets where the bank-based and the market-based financial institutions have room for effectively pursuing their goals. This is particularly important in the current phase, which is characterized by overindebted firms due to the Covid-19 pandemic. Indeed, the large amount of funds coming from the 'European Recovery and Resilient Facility' can foster private investments and accelerate the evolution of institutional investors. This opportunity should be exploited to trigger the evolution of EA financial markets.

References

1. Acemoglu, D. and F. Zilibotti (1999): "Information Accumulation in Development," *Journal of Economic Growth*, Vol. 4, pp. 5‑38.
2. Adrian, T. and H. S. Shin (2014): "Procyclical Leverage and Value-at-Risk," *The Review of Financial Studies*, Vol. 27, Issue 2, February 2014, pp. 373‑403.
3. Allen, F., Bartiloro, L. and O. Kowalewski (2007): "Does economic structure determine financial structure?" *AFA 2007 Chicago Meetings Paper*.
4. Angeloni, I. (2020): "Beyond the pandemic: Reviving Europe's Banking Union," May, London: Centre for Economic Policy Research.
5. Arcand, J-L, Berkes, E. and U. Panizza (2015): "Too much finance?" *Journal of Economic Growth*, Vol. 20, issue 2, pp. 105-148.
6. Arrow, K.J. (1970): *Essays in the theory of risk-bearing*. Amsterdam: North Holland.
7. Bats J. V. and A. C. Houben (2020): "Bank-based versus market-based financing: Implications for systemic risk," *Journal of Banking and Finance*, Vol. 114.
8. Beck, T. and R. Levine (2002): "Industry growth and capital allocation: does having a market- or bank-based system matter?" *Journal of Financial Economics*, Vol. 64, pp. 147-180.
9. Bencivenga, V. and Smith, B. (1991): "Financial intermediation and endogenous growth," *The Review of Economic Studies*, Vol. 58(2), pp. 195-209.
10. Benigno, P.P., P. Canofari, G. Di Bartolomeo and M. Messori (2021): "The ECB's Measures in Support of the COVID-19 Crisis," Publication for the committee on Economic and Monetary Affairs, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg, pp. 1-34; also in *SEP Working Paper*, n. 4.
11. Boot W. A. A. and A. Thakor (1997): "Financial System Architecture," Review of Financial Studies, Vol. 10, No. 3, pp. 693‑733.
12. Boyd, J. H. and B. D. Smith (1998): "The evolution of debt and equity markets in economic development," *Economic Theory*, Vol. 12, pp. 519‑560.
13. Carlin, W. and C. Mayer (2003): "Finance, investment, and growth," *Journal of Financial Economics*, Vo. 69 (1), pp. 191‑226.
14. Cecchetti, S. G. and E. Kharroubi (2012): "Reassessing the impact of finance on growth," *BIS Working Papers*, No. 381, July.
15. Coase, R.H. (1937): "The nature of the firm," *Economica*, Vol. 4, pp. 386-405.
16. Demigurc-Kunt A., E. Feyen and R. Levine (2011): "The evolving importance of banks and markets," *The World Bank Economic Review*, Vol. 27(3), pp. 476-490.
17. Easterly, W., Islam, R. and J. Stiglitz (2000): "Shaken and Stirred: Explaining Growth Volatility," In Annual World Bank Conference on Development Economics 2000, edited by Boris Pleskovic and Joseph E. Stiglitz. Washington: World Bank.

18. Esposito, P. and M. Messori (2019): "Competitive or recession gains? On the recent macroeconomic rebalances in the EMU," *The North American Journal of Economics and Finance*, Vol. 47, pp. 147-167.

19. Gambacorta, L., Yang, J. and K. Tsatsaronis (2014): "Financial structure and growth," *BIS Quarterly Review*, March.

20. Goldsmith, R. W. (1969): Financial Structure and Development, Yale University Press, New Haven.

21. Grenwood, J. and Jovanovich, B. (1990): "Financial Development, growth and the distribution of income," *Journal of Political Economy*, Vol. 98(5), 1076-1108.

22. Grossman, S.J., and O.D. Hart (1983), "An analysis of the principal-agent problem," *Econometrica*, Vol. 51, pp. 7-45.

23. Hart, O. (1995), *Firms, contracts, and financial structure*. Oxford: Oxford University Press. J

24. Jensen, M.C., and W.H. Meckling (1976): "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics*, Vo. 3, pp. 305-60.

25. King, R.G., and R. Levine (1993a): "Finance and growth: Schumpeter might be right," *Quarterly Journal of Economics*, Vol. 108(3), pp. 717-37.

26. King, R.G., and R. Levine (1993b): "Finance, entrepreneurship and growth: Theory and evidence," *Journal of Monetary Economics*, Vol. 32(3), pp. 513-42.

27. Kumar, K. B., Rajan, R. G., and L. Zingales (1999): "What determines firm size?" National Bureau of Economic Research (NBER) Working Paper, No. w7208, July.

28. Kwok, C. and S. Tadesse (2006): "National culture and financial systems," *Journal of International Business Studies*, Vol. 37(2), pp. 227-247.

29. Langfield, S. and M. Pagano (2015): "Bank bias in Europe: Effects on systemic risk and growth," *Economic Policy*, Vol. 31(85), pp. 51-106.

30. Lannoo, K. and Thomadakis, A. (2019): *Rebranding Capital Markets Union: A Market Finance Action Plan*, Brussels: CEPS and ECMI.

31. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and R. Vishny (1997) : "Legal determinants of external finance," *Journal of Finance*, Vol. 52(3), pp. 1131-1150.

32. Levine, R. (1997): "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature*, Vol. 35(2), pp. 688-726.

33. Levine, R. (2002): "Bank-Based or Market-Based Financial Systems: Which Is Better?" *Journal of Financial Intermediation*, Vol. 11, issue 4, pp. 398-428.

34. Levine R. (2005): "Finance and Growth: Theory and Evidence," Handbook of Economic Growth, in: Aghion P. and S. Durlauf (ed.), Vol. 1, pp. 865-934.

35. Levine, R. and S. Zervos (1998): "Stock Markets, Banks, and Economic Growth," *American Economic Review*, Vol. 88, No. 3, pp. 537-558.

36. Levine, R., Lin, C., and W. Xie (2015): "Spare tire? Stock markets, banking crises, and economic recoveries," NBER Working Paper No. 20863.

37. Love, I. and L. Zicchino (2006): "Financial development and dynamic investment behavior: Evidence from panel VAR," *The Quarterly Review of Economics and Finance*, Vol. 46(2), pp. 190‑210.

38. Manganelli, S., and A. Popov, A. (2013): "Financial dependence, global growth opportunities, and growth revisited," *Economics Letters*, Vol. 120(1), pp. 123‑125.

39. Messori, M. (2019): "The inevitable evolution of European financial markets," *SEP Working Paper*, n. 13, pp. 1-24.

40. Messori, M., Canofari, P., Esposito, P., Milani, C., (2015). "In Search of a New Equilibrium: economic imbalances in the Eurozone", *IAI Research Papers*, n.17, Edizioni Nuova Cultura.

41. Milde, H. and J.C. Riley (1988): "Signaling in credit markets", *Quarterly Journal of Economics*, Vol. 103, pp. 101-29.

42. Pagano, M., Langfield, S., Acharya, V., Boot, A., Brunnermeier, M. K., Buch, C., Hellwig, M., Sapir, A., and van den Burg, I. (2014): "Is Europe Overbanked?" Reports of the Advisory Scientific Committee, No. 4.

43. Pagano, M. and Pica, G. (2012): "Finance and employment," *Economic Policy*, Vol. 27(3), pp. 5‑55.

44. Rajan, R. G. and L. Zingales (1998): "Financial Dependence and Growth," *The American Economic Review*, Vol. 88, pp. 559‑586.

45. Reinhart, C. and K. Rogoff (2011): This time is different: Eight centuries of financial folly. Princeton University Press.

46. Rothschild, M., and J.E. Stiglitz (1976), "Equilibrium in competitive insurance markets: An essay on the economics of imperfect information", *Quarterly Journal of Economics*, Vol. 90, pp. 629-49.

47. Schivardi, F., Sette, E. and G. Tabellini (2019): "Credit Misallocation during the European Financial Crisis," *CEPR Discussion Paper*, No. DP11901.

48. Schnabel, I. (2020): "Going negative: the ECB's experience." Roundtable on Monetary Policy, Low Interest Rates and Risk Taking at the 35th Congress of the European Economic Association, Frankfurt.

49. Schnabel, I. (2021): "The rise of non-bank finance and its implication for monetary policy transmission," *Speech at the Annual Congress of the European Economic Association.*

50. Stiglitz, J.E., A. Weiss (1981): "Credit rationing in markets with imperfect information," *American Economic Review*, Vol. 71, pp. 393-410.

51. Stiglitz, J.E., and A. Weiss (1992): "Asymmetric information in credit markets and its implications for macro-economics", *Oxford Economic Papers*, 44, 694-724.

52. Tirole, J. (1988): *The theory of industrial organization*, Cambridge Ma.: MIT Press.

53. Williamson, O.E. (1975): *Markets and hierarchies: Analysis and antitrust implications*, New York: Free Press.

54. Williamson, O.E. (1989): "Transaction cost economics", in *Handbook of industrial organization*, edited by R. Schmalensee and R. Willig, Amsterdam: North Holland.

Appendix A

Table A1: Fixed effects on GVA: full specification

	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE
$\Delta tradeop_{t-1}$	0.073	0.036	0.03	0.603	-0.189	0.077	0.041	0.034	0.548	-0.186	0.067	0.038	0.035	0.373	-0.229
	[0.055]	[0.044]	[0.048]	[0.372]	[0.251]	[0.056]	[0.047]	[0.049]	[0.401]	[0.255]	[0.057]	[0.048]	[0.044]	[0.448]	[0.271]
$\Delta Schooling_{t-1}$	-0.067	-0.154	-0.186	0.561	0.166	-0.061	-0.146	-0.179	0.544	0.16	-0.079	-0.148	-0.186	0.606*	0.011
	[0.153]	[0.165]	[0.174]	[0.250]	[0.303]	[0.153]	[0.167]	[0.174]	[0.250]	[0.309]	[0.149]	[0.166]	[0.165]	[0.205]	[0.331]
$Hicprate_{t-1}$	-0.002	-0.002	-0.001	-0.003*	0.001	-0.002	-0.002	-0.001	-0.003	0.001	-0.002	-0.002	-0.001	-0.003*	0.002
	[0.002]	[0.001]	[0.002]	[0.001]	[0.004]	[0.002]	[0.001]	[0.002]	[0.001]	[0.004]	[0.002]	[0.001]	[0.002]	[0.001]	[0.003]
ΔKAP_{t-1}	-0.189	-0.215	-0.246	-0.099	0.206	-0.19	-0.216	-0.252	-0.091	0.195	-0.18	-0.214	-0.26	-0.066	0.178
	[0.144]	[0.150]	[0.225]	[0.126]	[0.140]	[0.145]	[0.151]	[0.232]	[0.130]	[0.183]	[0.149]	[0.154]	[0.230]	[0.114]	[0.145]
ΔlnGFCF	0.028	-0.001	-0.048	0.023	0.119**	0.026	-0.003	-0.051	0.023	0.118*	0.025	-0.008	-0.054	0.018	0.129**
	[0.026]	[0.028]	[0.033]	[0.030]	[0.029]	[0.026]	[0.026]	[0.034]	[0.031]	[0.034]	[0.026]	[0.026]	[0.034]	[0.034]	[0.036]
$\Delta MarkShare_{t-1}$	0.234**	0.262**	0.182*	0.290*	0.388*	0.196*	0.238**	0.169	0.199	0.376	0.212**	0.239***	0.193*	0.176	0.442*
	[0.072]	[0.064]	[0.096]	[0.122]	[0.192]	[0.079]	[0.057]	[0.110]	[0.155]	[0.286]	[0.061]	[0.048]	[0.081]	[0.119]	[0.227]
$\Delta BankShare_{t-1}$	-0.093	-0.166	-0.391	-0.044	0.003	-0.067	-0.146	-0.387	-0.036	0.001	0.203	0.067	-0.173	0.118	1.32
	[0.124]	[0.129]	[0.348]	[0.071]	[0.315]	[0.143]	[0.147]	[0.352]	[0.078]	[0.320]	[0.199]	[0.162]	[0.276]	[0.097]	[0.721]
$\Delta MarkShare_{t-1}$(T>2009)						0.18	0.117	0.138	0.159	0.066					
						[0.200]	[0.156]	[0.278]	[0.137]	[0.569]					
$\Delta BankShare_{t-1}$ (T>2009)											-0.611**	-0.472***	-0.627*	-0.395*	-2.036*
											[0.186]	[0.088]	[0.186]	[0.121]	[1.045]
N	328	237	143	73	91	328	237	143	73	91	328	237	143	73	91
R-sq	0.889	0.479	0.465	0.731	0.968	0.89	0.479	0.465	0.733	0.968	0.892	0.491	0.471	0.748	0.971

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level

Table A2: Fixed effects on Gross Fixed Capital Formation: full specification

	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE	EU27	EU15	EA12core	EA12per	CEE
$\Delta tradeop_{t-1}$	-0.043	-0.345*	-0.383*	2.155	0.24	0.008	-0.319*	-0.373*	1.645	0.479	-0.059	-0.346**	-0.386*	1.329	0.169
	[0.224]	[0.126]	[0.141]	[1.209]	[0.536]	[0.230]	[0.131]	[0.144]	[1.118]	[0.490]	[0.216]	[0.114]	[0.148]	[1.426]	[0.595]
$\Delta Schooling_{t-1}$	-0.031	-0.397	-0.46	-0.614	0.446	0.033	-0.351	-0.44	-0.780	-0.006	-0.067	-0.387	-0.459	-0.431	-0.154
	[0.334]	[0.391]	[0.463]	[0.500]	[0.884]	[0.345]	[0.419]	[0.556]	[0.725]	[0.581]	[0.326]	[0.398]	[0.452]	[0.544]	[1.119]
$Hicprate_{t-1}$	-0.007	-0.001	-0.005	0.000	-0.026	-0.007	-0.001	-0.005	0.000	-0.028*	-0.007	-0.002	-0.005	-0.002	-0.022
	[0.006]	[0.001]	[0.003]	[0.003]	[0.015]	[0.006]	[0.001]	[0.003]	[0.003]	[0.012]	[0.006]	[0.001]	[0.003]	[0.003]	[0.015]
ΔKAP_{t-1}	-0.491*	-0.349*	-0.323	0.192	-1.387*	-0.481*	-0.349*	-0.326	0.258	-2.163*	-0.487*	-0.365*	-0.315	0.283	-1.635*
	[0.186]	[0.118]	[0.191]	[0.276]	[0.725]	[0.207]	[0.127]	[0.215]	[0.299]	[0.641]	[0.214]	[0.129]	[0.206]	[0.325]	[0.639]
$\Delta lnGVA$	0.423*	0.795**	1.011**	0.251	0.084	0.378	0.767*	1.005*	0.133	0.021	0.338	0.716*	1.020**	-0.087	-0.019
	[0.242]	[0.235]	[0.280]	[0.437]	[0.247]	[0.246]	[0.255]	[0.292]	[0.431]	[0.220]	[0.251]	[0.249]	[0.291]	[0.358]	[0.308]
$\Delta MarkShare_{t-1}$	0.464*	0.448*	0.596	0.866	1.249*	0.110	0.325	0.568	0.007	0.242	0.377*	0.381	0.589	0.496	1.369*
	[0.233]	[0.251]	[0.320]	[0.428]	[0.581]	[0.295]	[0.367]	[0.402]	[0.539]	[0.415]	[0.198]	[0.237]	[0.322]	[0.342]	[0.443]
$\Delta BankShare_{t-1}$	-0.358	-0.784**	-0.122	-0.445	0.759	-0.183	-0.716**	-0.118	-0.355	0.795	0.578	-0.244	-0.239	0.183	4.892**
	[0.326]	[0.222]	[0.935]	[0.262]	[0.754]	[0.324]	[0.222]	[0.918]	[0.243]	[1.075]	[0.499]	[0.315]	[0.701]	[0.314]	[0.922]
$\Delta MarkShare_{t-1}$(T>2009)						1.316*	0.449	0.177	1.561**	5.642***					
						[0.594]	[0.563]	[1.458]	[0.192]	[0.803]					
$\Delta BankShare_{t-1}$ (T>2009)											-1.970**	-1.121**	0.34	-1.521*	-6.709**
											[0.643]	[0.364]	[1.788]	[0.441]	[1.315]
N	340	242	148	73	98	340	242	148	73	98	340	242	148	73	98
R-sq	0.403	0.428	0.445	0.68	0.649	0.416	0.43	0.446	0.704	0.702	0.426	0.439	0.446	0.711	0.686

Standard errors in brackets. * significant at 10% level; **significant at 5% level; ***significant at 1% level

Figure A1 Response of GVA and investment in Machinery and Equipment

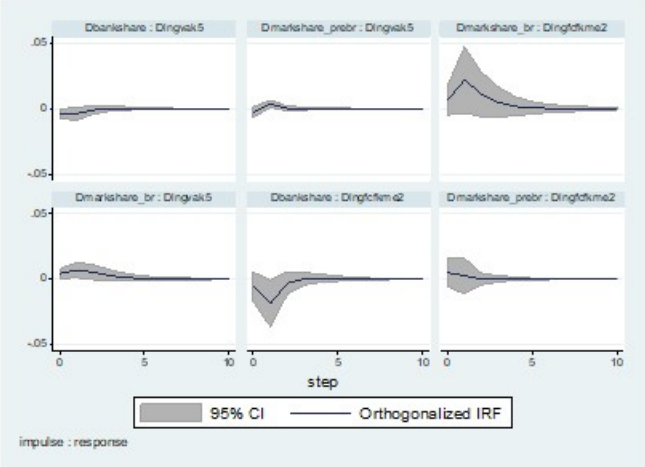


Figure A2 Response of GVA and Constructions investment

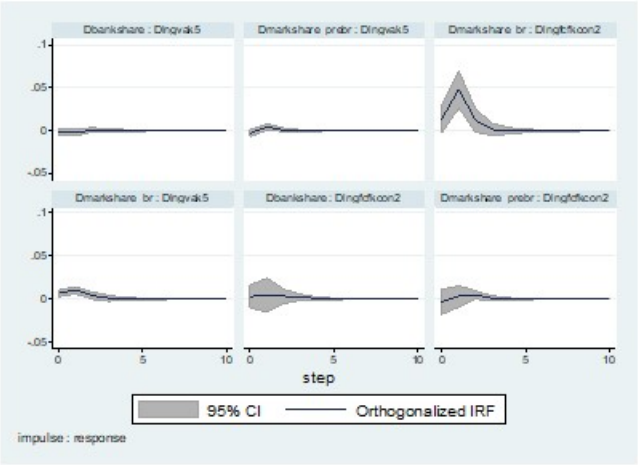


Figure A3 Response of GVA and ICT investment

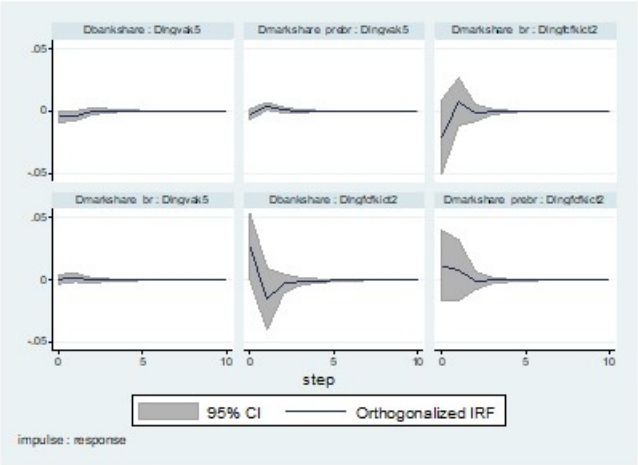


Figure A4 Response of GVA and IPP investment

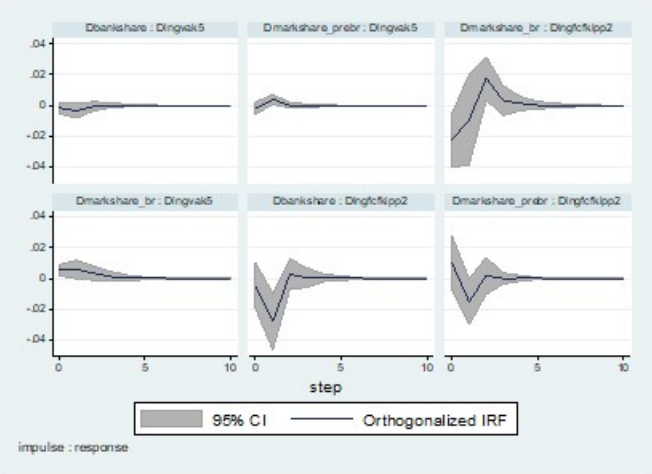


Figure A5 Responses of GVA and GFCF, specification with break in ΔMarkShare: EU15

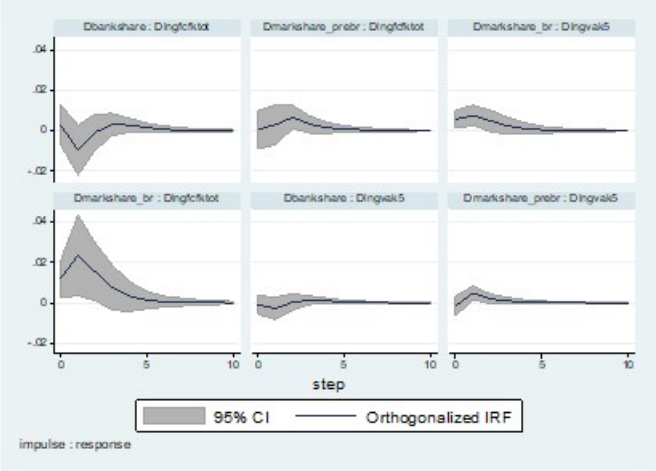


Figure A6 Responses of GVA and GFCF, specification with break in ΔMarkShare: EA12 core

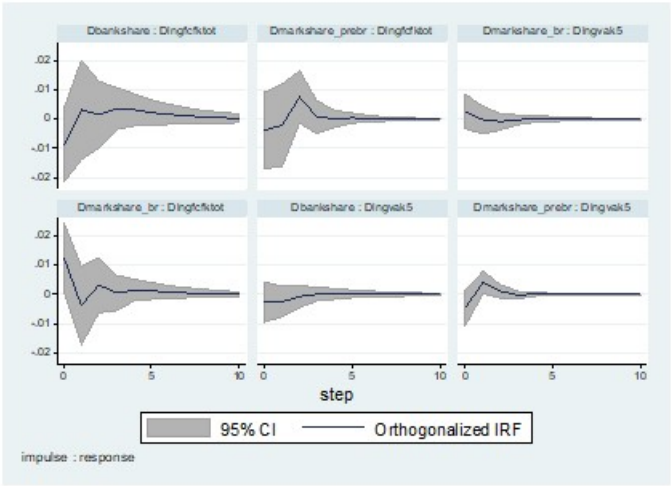


Figure A7 Responses of GVA and GFCF, specification with break in ΔMarkShare: EA12 periphery

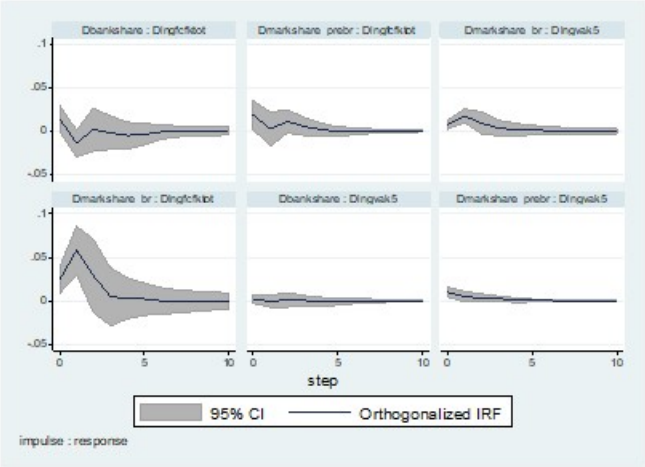


Figure A8 Responses of GVA and GFCF, specification with break in ΔMarkShare: CEEs