



EUROPEAN

POLICYBRIEF



FINANCIALIZATION IN EU AND ITS CONSEQUENCES

Stefano Battiston,¹ Mattia Guerini,² Mauro Napoletano,³ Veronika Stolbova⁴

16 April 2018

ISIGrowth is a 3-year EC Horizon 2020 funded project aimed at offering comprehensive diagnostics on the relationship between innovation, employment dynamics and growth in an increasingly globalised and financialised world economy. The project will provide a coherent policy toolkit to achieve the Europe 2020 objectives of smart, sustainable and inclusive growth. The theoretical foundation is based on the dynamic link between Schumpeterian economics of innovation and Keynesian demand policies. Analytical tools include agent-based modelling, non-parametric statistics, and detailed case studies of business and industry histories.

¹ Department of Banking and Finance, University of Zurich (Switzerland): stefano.battiston@uzh.ch

² Department of Innovation and Competition, OFCE – SciencesPo (France) and Scuola Superiore San’Anna, Pisa (Italy): mattia.guerini@sciencespo.fr

³ Department of Innovation and Competition, OFCE – SciencesPo (France) and SKEMA Business School and Scuola Superiore San’Anna, Pisa (Italy): mauro.napoletano@sciencespo.fr

⁴ Department of Banking and Finance, University of Zurich (Switzerland): veronika.stolbova@uzh.ch

Building on ISIGrowth research, in this policy brief we present empirical evidence on the patterns of increasing financialization in the EU in the last two decades, an analysis of its possible adverse effects on several objectives of the EU 2030 agenda, including inclusive growth, innovation, inequality and financial stability. We conclude by providing some policy insights and recommendations.

The notion of financialization reflects, on the one hand, the engagement of non-financial firms into financial activities not directly related to production, and, on the other hand, the relative size of the financial sector with respect to the overall economy. Several empirical indicators show that financialization has been increasing in the Euro Area in the last two decades. This finding is important because while financialization has been so far mostly considered to be a driver for growth and innovation, there is today a wealth of theoretical arguments and empirical evidence pointing to the detrimental effects of excessive financialization for growth, innovation, inequality and financial stability.

First, excessive financialization depresses economic growth because it implies that a larger fraction of credit is directed toward unfruitful investment projects, possibly generating economic crises (e.g. via housing price bubbles). Second, financialization has negative impact on innovation because the separation between actors taking risks from innovation and actors extracting rents from innovation implies lower share of reinvested profits (e.g. via short-termism and share buy-backs). Third, financialization contributes to inequality by strengthening top earners' bargaining power in terms of higher wages and lower taxation, as well as by burdening public budgets with fiscal assistance to financial institutions in time of crisis. Fourth, financialization may lead to financial instability by increasing both the leverage of interconnected financial institutions and the risk of mispricing of large asset classes (e.g. the dynamics of leverage and mispricing of mortgage backed securities in the run of the 2008 financial crisis).

We suggest some countermeasures that could help containing excessive financialization, including: (i) fostering the demand in the real sector; (ii) establishing mission-oriented programs by going beyond the traditional conceptual framework to fix market failures and aim to create markets where they may not exist at all; (iii) encouraging the alignment of top managers' compensation schemes with long-term profit and corporate social responsible goals; (iv) studying the possibility of setting a minimal ratio on banks for lending to the real economy (to non-real estate sectors); (v) studying the possibility of setting a maximal level of intra-financial leverage for financial institutions.

INTRODUCTION

Since the middle 1980s many economies have undergone a process of *financialization*, broadly characterized as the overgrowth of the financial sector compared to all real sectors of the economy. To be more precise, this process has been defined as “*a pattern of accumulation in which profits accrue primarily through financial channels, rather than through trade and commodity production*” (Krippner, 2005) or, alternatively, as “*the increasing role of financial motives, financial markets, financial actors and financial institutions*” (Epstein, 2005).

The study of the consequences of financialization is a subject of great concern for policy makers and a timely topic of research for economists and practitioners. Financialization indeed, has naturally tight connections with the role that credit and financial markets play in shaping economic growth, industrial dynamics, employment, inequality (within and between), and finally, in the generation of large crises like the one of 2007/2008.

Recent studies on the matter are yet inconclusive and results on the effects of financialization are still mixed. While some authors claim that this process might lead to increased long-run economic performances (Neely, 1999), others argue instead that it might increase inequality and have negative effects on employment (Assa, 2012).

In this policy brief, we discuss recent advances in the research and present results stemming from the ISIGrowth research consortium concerning (i) the macro and industry patterns of financialization in the Euro Area and (ii) the consequences that the financialization process has on the economic system. By collecting the results, we also identify the possible policy trade-offs and provide policy recommendations derived from the ISIGrowth research efforts.

Using old indicators as well as new metrics proposed by the ISIGrowth consortium, we keep track of the level of financial activities vis-à-vis real ones and we point to an increase in the degree of financialization in the Euro Area during the last two decades. However, while in the last decades financialization has mostly been considered to be a driver for growth and innovation, today there is a growing evidence that seriously challenges this view. In particular, an excessive degree of financialization has adverse consequences for several objectives of the EU 2030 agenda, including innovation, inclusive growth and financial stability. Therefore, excessive financialization should be contained. However, there are no current policies aimed at mitigating the negative effects of financialization on the economy. At the end of this policy brief, we collect some policy suggestions stemming from the evidence provided by the scientific research carried out within the ISIGrowth project.

PATTERNS OF FINANCIALIZATION IN THE EUROPEAN UNION

Drawing from the analysis discussed in the ISIGrowth paper by Stolbova et al. (2017), in Figure 1 we present the evolution of the ratio of Total Financial Assets (TFA) to the Gross Domestic Product (GDP) of an economy. An increase in this ratio implies that the total financial assets in a given economy have been increasing faster than GDP. Furthermore, since the GDP amounts to the total value added in the economy generated in a particular year, a possible interpretation of the Figure 1

is that increasing portions of sales from goods and services accrue to financial assets rather than being reinvested in real assets.

The lowest growth of the TFA to GDP ratio in the Euro Area is observed for Germany, for which the measure has been relatively stable in the last 16 years. In contrast, for the French economy, the TFA to GDP ratio has been steadily increasing since 2005, reaching a cumulative growth of 40%. However, for these two continental economies, the growth patterns of TFA to GDP are quite different from the one observed in the United Kingdom, where the same ratio has experienced the highest growth since the very beginning of the 21 century (around 100% cumulative growth in the first decade). Finally, the compound growth rate is much larger in the EA-19 group than in France and Germany, implying that the other European economies have experienced a larger growth of the TFA to GDP ratio with respect to the two largest European economies.

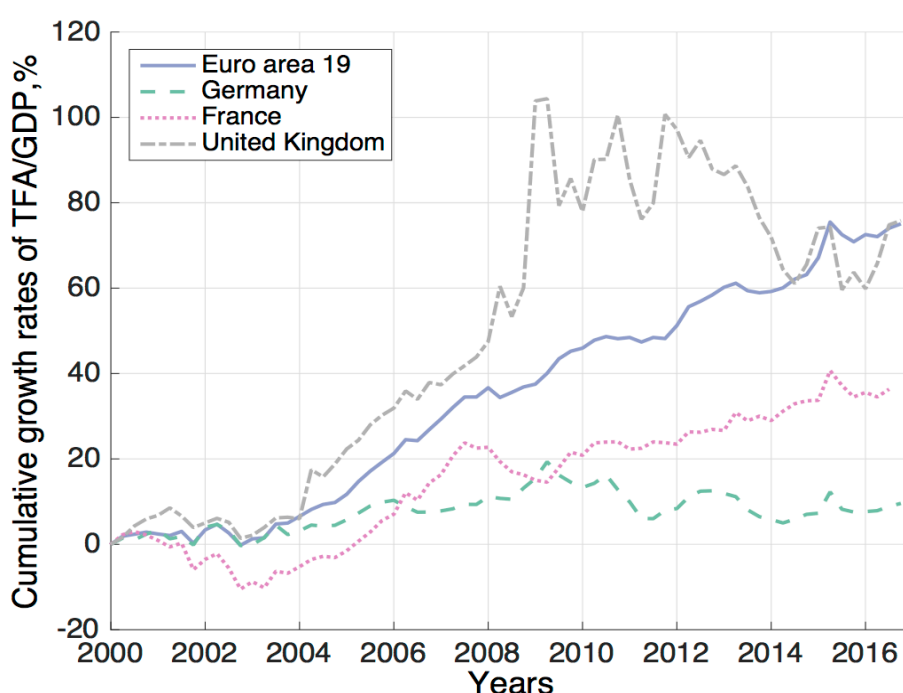


Figure 1. Compound growth rates of the macroeconomic measure of financialization for the Euro Area 19 and for largest EU economies. Financialization (y-axis) is measured as TFA/GDP. Each year has then been rescaled to obtain growth rates using the following formula: $(TFA/GDP)_t / (TFA/GDP)_{2000} - 1$. Source: authors' computations based on the ECB Data Warehouse.

The ratio of Property Income Receivable (*PIR*) to Gross Entrepreneurial Income (*GEI*), presented in Figure 2, captures instead the share of total Non-Financial Corporations (NFC) profits stemming from firms' ownership of financial assets, opposed to profits that the same non-financial firms generate from their core productive activities. This ratio helps to measure the degree of financialization of non-financial firms (see also Lazonick and Mazzucato, 2013 and the next section). Three time-snapshots (2000, 2010, 2016) of this measure are presented in Figure 2. We note that the French NFC are by far the most financialized. As a matter of fact, 25% of GEI is generated by means of property income, and the ratio is also significantly higher for France than for the EA-19 as a whole. In contrast, German firms are the least financialized ones, although the share of entrepreneurial income generated via interests, dividends and other returns on assets has increased by about 5% since 2000. Finally, non-financial corporations are also significantly financialized in the UK, although property income receivable decreased after the 2008 crisis (from 26% to 15%). This

increasing trend in financialization of European NFCs is also discernible from the ratio between financial assets and fixed assets as well as from the exposures to financial assets of different institutional sectors.⁵ Financial exposures are also presented in Table 1, which indicates that about one third of EU financial exposures, are related to activities located outside the Euro Area. This latter reflects the globalization of financial flows. It also captures the potential exposure of the overall Euro Area financial and real sectors to external financial shocks.

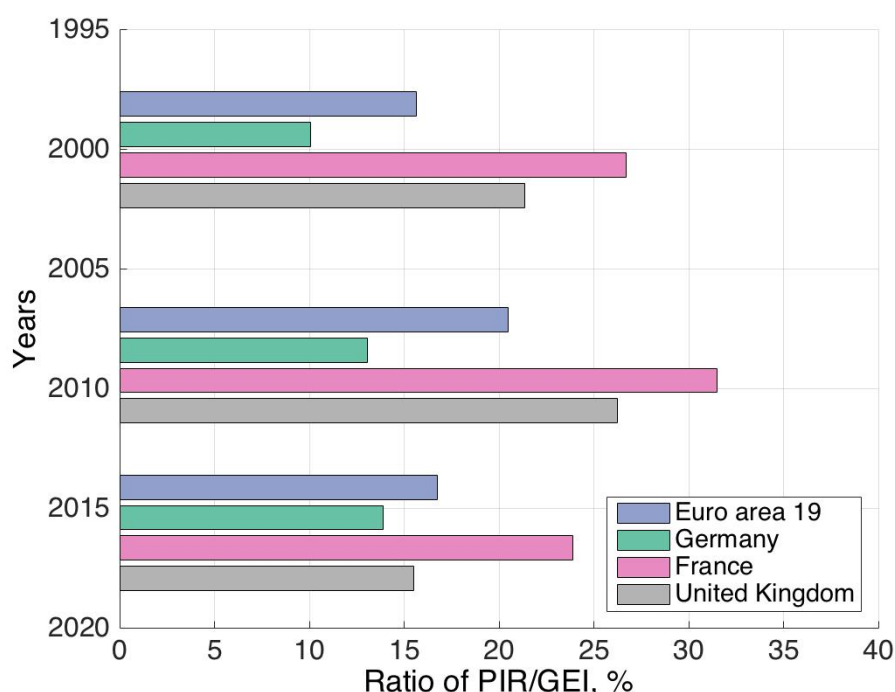


Figure 2. Ratio between property income receivable and gross entrepreneurial income (PIR/GEI). Non-financial corporations. Source: authors' computations based on the ECB Data Warehouse.

Assets' owner / Investment target	Financial sector of Euro Area	Real economy of Euro Area	Other destinations
Financial sector of Euro Area	36.17%	35.10%	28.73%
Real economy sector of Euro Area	44.33%	28.01%	27.66%

Table 1. Financial exposures between financial (through equity shares, investment funds shares, bonds, loans and insurance and pension scheme guarantee) and real sectors of the of the Euro Area (EA), aggregated, Q4, 2015.

The evidence about the overall exposures of the financial sector outlined above is also coherent with the evolution of loans (one particular set of financial exposures) to financial (FC) and non-financial corporations (NFC). The fraction of loans going to the real economy is still higher than the one going to the financial sector (see Figure 3, left panel). Nevertheless, this fraction has steadily been decreasing since 2009. This fact goes hand in hand with the right panel of Figure 3 that compares the compound growth rates of the loans granted to NFC and FC. After 2009 the growth of loans to financial corporations has exceeded by far the loans to non-financial firms. This last evidence adds

⁵ Figures relating to these last two measures are presented and described in detail in the online technical appendix.

to another empirical research carried out within the ISIGrowth consortium (see also Battiston and Napoletano, 2017).

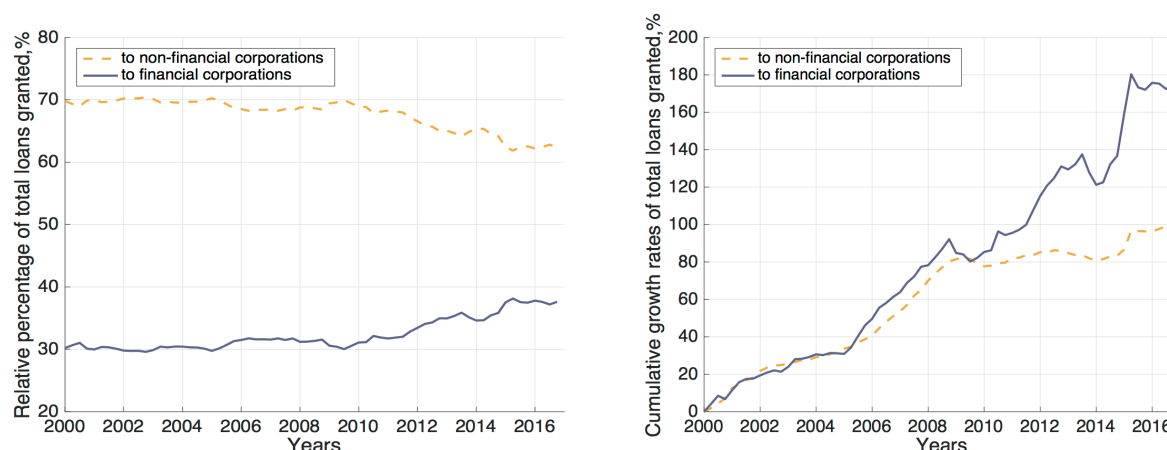


Figure 3. *Left:* percentage of total loans granted to non-financial corporations (dashed yellow) and to financial corporations (solid blue) in the Euro Area. *Right:* cumulative growth rates of loans granted to non-financial corporations (dashed yellow) versus financial corporations (solid blue) compared to the first quarter of 2000. Source: authors computations on ECB Data Warehouse.

Summing up the evidence coming from the different indicators presented so far, we can first conclude that the European Union - as a whole - has become more financialized since the beginning of the century. Interestingly, the increasing financialization has not just concerned financial corporations, which have become increasingly focused on channeling resources towards the financial sector itself. It has also encompassed non-financial firms, who have significantly increased their share of property income and increased the share of financial assets in their balance sheets. The Great Recession has marked a temporary stop in the above trends, which have however recovered a sustained pace since then. At the same time, financialization has not been homogeneous across countries in the Union. Countries like the United Kingdom and France indeed look much more financialized than Germany. In the latter, the growth of financial assets over GDP, as well as the process of financialization of firms has been much milder, and below the average of the Euro Area.

Finally, evidence from the ISIGrowth research shows that financialization has also been associated with the increasing importance of market-based financial intermediation. A research paper by Granier et al. (2017) has investigated the similarities between the recently introduced *Junior Stock-Markets (JSM)* in some European countries and an archetypical market-based financial structure, represented by the *Alternative Investment Market (AIM)* created by the London Stock Exchange in 1995. The qualitative evidence suggests that also in this case there is a notable degree of heterogeneity across different EU countries: the German JSM is the one that resembles the most a capital-based institutional structure while the JSMs introduced in other countries such as Italy, France and Sweden are much closer to the Anglo-Saxon AIM, suggesting a market-based orientation of these countries financial systems.

CONSEQUENCES OF THE FINANCIALIZATION PROCESS

The ISIGrowth project does not focus only in detecting financialization patterns in the EU. It also aims at answering a question of even more central importance for the general economic debate and for policy makers: “*What are the economic effects of the process of financialization?*”. In this section we revisit the economic literature on the role and the effects of finance, taking into account the new evidence provided by the project’s research. We highlight that financial development can have a positive effect on the economy, by favoring a better allocation of resources. At the same time we identify the possible drawbacks that stem from financialization.

Effects on Economic Growth

A well-functioning financial system plays an essential role in promoting economic development. The development of finance can improve investment efficiency by favoring a better allocation of the available resources to the best economic projects. This positive view, however, has been fiercely criticized by many economists and policy makers, specifically, after the burst of the housing bubble and the onset of the global financial crisis in 2007. The financialization process documented in the previous section does not seem to have positively contributed to investments and to a recovery of industrial production and economic growth in Europe.

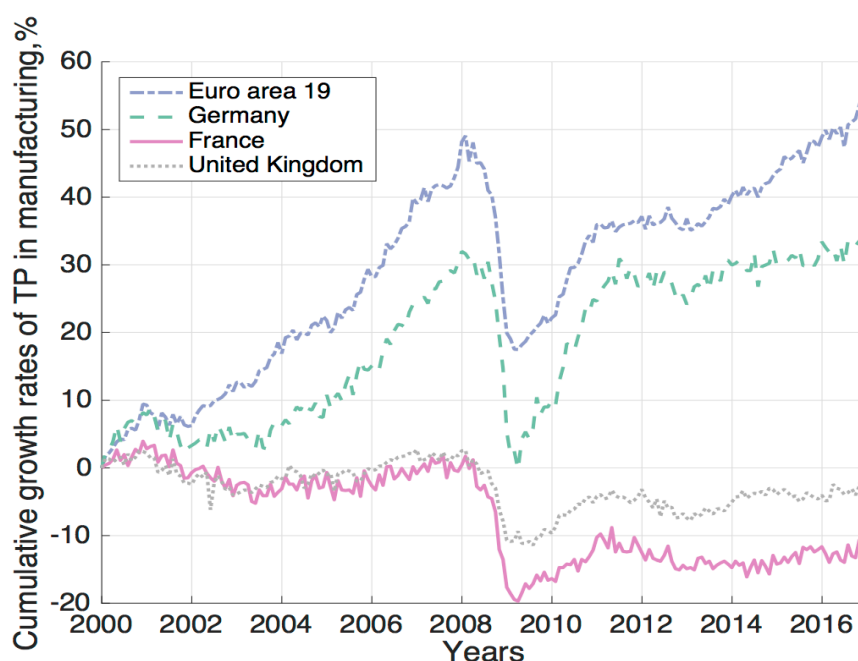


Figure 4. Cumulative growth rate of total production in the manufacturing sector for selected EU economies. Source: authors’ calculations using Eurostat short-term business statistics which measure the volume of industrial production.

Figure 4 presents the evolution of total manufacturing production for selected EU economies and for the EA-19 as a whole. From the picture it is clear that countries where the financialization process was less pronounced (i.e. Germany) managed to increase their production output and to expand their capacity since the early 2000s and even more after the crisis hit - growing cumulatively of about 30%. In contrast, France and United Kingdom - i.e. two countries where the financialization process has been stronger - suffered anemic industrial production growth since the beginning of the century

and they did not yet manage to reach the level of production they experienced in the early 2000s. Clearly, it is possible that financialization is not the only driver of these patterns and that to some extent, other country-specific institutional factors could have played important roles. However, this interpretation is in line with theoretical results produced by the ISIGrowth project. Fagiolo et al., 2017 show that output growth is higher in an environment with the presence of a commercial banking activity, vis-à-vis a null model abstracting from it; but an excess of financial dependence might reduce growth. The authors find a significant inverted-U shaped relation between financial depth and GDP growth, meaning that when financialization is too strong, a large fraction of credit is directed toward unfruitful investment projects and negatively affects growth. Guerini et al. (2017) points instead not to the quantity of finance but to its quality. They show that the large increases in mortgage debt, were the most harmful among the lending activities in the last 50 years, with an overall medium-term negative impact on economic growth. In contrast, public debt has played a positive role in stimulating growth.

Effects on Innovation and on Employment in Innovative Sectors

Several scholars have warned against the dangers of the increasing financialization of non-financial firms, as this might imply that the corporates' retained profits have been redirected from investment in R&D or in capacity expansion, toward investments in other financial securities. Consistently with the Maximization of Shareholder Value (MSV hereafter) indeed, capital gains and financial profits are not re-invested in productive facilities but they are re-distributed to shareholders, through dividend payouts or share buybacks. Researchers in the ISIGrowth consortium have extensively investigated this issue (see Lazonick, 2017a and 2017b; Sakinc, 2017; Kotnik et al., 2017). According to Lazonick and Mazzucato (2013), the negative influence of the MSV principle on innovative practices must be attributed to the tension between creation and extraction in the innovation processes: it is the continuously increasing separation between actors who take risks of innovation and actors that receive the rents from it that lies behind such tension and behind the fall in the share of reinvested profits. When these conditions apply, investments in some specific areas might be absent. Using a theoretical model Dawid et al. (2018) studied the relation between manager remuneration schemes and long-term performance of an industry showing that an increase in the share-based remuneration component, reduces the incentives of the manager to invest in productivity-enhancing activities that would instead pay-off (in terms of higher productivity) over longer time horizons.

All in all, these results suggest that regulatory interventions limiting the possibility for extensive share-based manager remuneration or reducing share buybacks might have a substantial positive effect on productivity growth. Furthermore, Dosi et al. (2016) cast doubts on the ability of financialization in favoring technological exploration, in particular the one by small firms. They highlight the increasing separation between the determinants of innovation and growth and the performance of firms on the financial markets. Value extraction behaviors on the stock markets, negatively influences the exploration of new technological paradigms as well as the search of new technologies within a known paradigm.

Finally, concerning employment in innovative sectors, Marin and Vona (2017) provide new evidence about the attractiveness of the financial sector for the brightest graduates in the science, technology, engineering and mathematical fields (STEM). The consequences for the productivity growth in other sectors over the period 1980-2014 is clear: the brain drain of STEM graduates by the financial sectors, has been associated with a cumulative loss of labor productivity growth of around 6.6% in the manufacturing sectors.

Effects on Inequality

Financialization has also been associated to the rise in inequality in the last decades. Kus (2012) suggests several possible channels of causation including: (i) the decrease in profitability of the non-financial sector, leading to the decrease of net wages in the same sector; (ii) the weakening of institutions and policies aimed at containing income disparity, such as unions and minimum wage laws; and (iii) the alignment of the corporate governance structure with shareholders' interests and with short-term profits objectives, leading firms to cut on labor costs and to reward top executives. Kus (2012) does not disentangle the specific channels of causation but finds a positive association between several indicators of financialization and the rise of inequality in 20 OECD countries between 1995 and 2007. Furthermore, Lin et al. (2013) find that financialization can explain more than half of the decline in labor's share of income mostly due to the decoupling of corporate profits and production and to the strengthening of the shareholders and elite workers' negotiating power. In what follows, we therefore focus on the impacts that financialization has on wage and taxation.

Wage. The increase in gross value added of the financial sector is likely to map into higher compensations to assets' owners and executives belonging to the top 1% of earners, hence increasing inequality, since the earnings of the "average employee" in the financial sector are well above the median compensation in the economy. Furthermore, as the non-financial corporations engage more and more in financial activities (as described in Figure 3 above) they increasingly replicate the governance and incentive structure of financial firms, which are characterized by the MSV principle. This structure of incentives tends to reward again owners and executives, positively contributing to inequality and increasing their bargaining power (see Lin et al., 2013).

Taxation. There are several ways in which financialization may contribute to inequality through the channel of taxation. A first mechanism is that in a more financialized economy the financial sector has an incentive to lobby for lower taxation of the top earners. Indeed, in the last two decades the tax reforms in almost all OECD countries have reduced top personal income tax rates as well as rates of other taxes affecting the highest income earners (see OECD Focus on Top Income 2014). Moreover, there is evidence that top earners are more efficient in optimizing their effective taxation (see the World Inequality Report by Alvaredo et al., 2018). A second mechanism is instead related to the fact that financialization is widely recognized as one of the factors leading to the 2008 global financial crisis, which in turn has taken a heavy toll on public finance. According to the ECB report by Meyer and Grussenmeyer (2015) the financial resources used for government bailouts in the Euro Area have been around 5.1% of GDP for the whole period 2008-2013; also, the total impact on debt for half of the countries was over 5% of GDP up to end-2013. Euro Area governments have acquired the resources to assist the financial sector mostly by issuing sovereign debt. The servicing of government debt incurred to remedy the 2008 financial crisis has been financed through taxation; hence it is likely that this has implied a net transfer from the bottom 99% to the top 1% earners, further contributing to inequality.

Effects on leverage and interconnectedness

Financialization is also associated either with an increase in leverage (if equity remains unchanged), or with an increase in interconnectedness (i.e. new contracts are established) of actors not only in the financial sector but also in real ones (Battiston et al. 2016a). An interesting case study in this respect is the Volkswagen (VW) Diesel scandal. VW Bank has engaged in originating and distributing Asset-backed Securities (ABS) collateralized around loans granted to VW customers to purchase VW cars. Other car producers have engaged in similar activities, implying that the exposure of the financial system to the automotive sector has extended beyond the ownership of equity shares or granting loans. As a consequence of the scandal on the diesel *defeat device*, the value of these ABS

held by a number of investors was at risk of heavy losses and many observers feared that the shock could possibly extend to systemic dimensions. “*All of a sudden, Volkswagen has become a bigger downside risk for the German economy than the Greek debt crisis*” ING chief economist Carsten Brzeski commented in an interview for Reuters.⁶ Even if there have not been systemic consequences in the aftermath of the “*dieselgate*”, a relevant question arises: as the real sector gets increasingly financialized it also becomes more and more exposed to financial shocks.

At the same time the financial sector becomes exposed in new ways to the real sector, beyond the traditional channels of equity shares. An ISIGrowth work by Battiston et al. (2016) shows that, contrary to common wisdom, too much interconnectedness is not good for stability and this might have strong impact also on financial stability.⁷ Finally, financialization can also have a negative impact on the recovery rate of contracts among financial firms. Contracts are collateralized by securities that may consist of debt obligations of third parties (e.g. government bonds, other banks’ securities, asset-backed securities). As observed during the 2008 credit crisis and the 2011 EU sovereign debt crisis, the value of these securities is subject to sudden variations. Financialization, by fueling excessive funds into certain asset classes (e.g. real-estate and mortgage related securities) can lead to systematic mispricing of large portions of assets used to collateralize the contracts. But when market participants become aware of the mispricing, the value of the recovery rate suddenly drops, together with the value of their balance sheets (see Battiston et al. 2016b and Stolbova et al. 2018 for details).

POLICY INSIGHTS AND RECOMMENDATIONS

Financialization can be assessed both at the micro-level and the macro-level. In this policy brief, the notion of financialization is broadly defined along two levels: at a macroeconomic level the notion refers to the relative size of the financial sector with respect to the overall economy; at the microeconomic level, the notion refers to the engagement of non-financial firms into financial activities not directly related to the production of goods and services.

Financialization is increasing in the Euro Area. Several empirical indicators, capturing various complementary aspects of the financialization process, show altogether an increase of financialization in the last 15 years in the Euro Area.

Excessive financialization has unintended adverse consequences for several objectives of the EU 2030 agenda, including innovation, inclusive growth and financial stability. While in the last decades financialization has mostly been considered to be a driver for growth and innovation, today there is ample evidence from empirical studies and theoretical arguments that seriously challenge the benefits of financialization and point to detrimental effects on innovation, growth and stability.

Excessive financialization should be contained. Currently there are no policies aimed at mitigating the negative effects of financialization on the economy. However, the evidence reported in this policy brief suggests that, in order to enable finance to remain a driver for innovative and

⁶ See <https://www.reuters.com/article/us-usa-volkswagen-germany-economy/volkswagen-could-pose-bigger-threat-to-german-economy-than-greek-crisis-idUSKCN0RN27S20150923>.

⁷ See also the online Technical Appendix for additional details about the effects that too much financialization might have on financial stability.

inclusive economic growth, financialization should be contained and to this end several measures could be taken including the following ones:

1. **Fostering the demand in the real sector.** On the one hand, there is a need to foster the demand in the real sector so that liquidity is channeled from the financial sector to productive activities. On the other hand, not all real sector activities are equivalent in terms of the possible long-run outcomes: households debt financing has more dangerous effects on growth than corporate debt (see also Guerini et al., 2017). As an example, policies supporting the creation of green infrastructures and the research in green-oriented technologies, instead of those fueling housing price bubbles might be welcomed.
2. **Establishing mission-oriented programs.** One conclusion from the ISIGrowth research project (see Mazzucato and Penna, 2015a, 2015b) is that the state should play a role in establishing mission-oriented programs in targeted areas (e.g. green infrastructures). The rationale for state intervention goes beyond the usual market-failure argument that in a given area there is a market not working correctly, which should be fixed. In contrast, the rationale is that markets may not exist at all in some areas and that mission-oriented projects enable to create new technological landscapes to deliver on the policy objective of innovation-fueled growth and to crowd-in new investments from the private sector.
3. **Encouraging the alignment of compensation schemes with long-term profit and firms' goals.** At the firm-level in the non-financial sector, discouraging short-termism would help to contain the engagement of non-financial firms into financial activities instead of productive activities. For example, the managers that receive stock options or other assets as part of their compensation schemes, should be constrained in the sales of these assets before a certain number of years, in order to align their the long-run incentives with those of the firm itself (see Dawid et al., 2018).
4. **Studying the possibility of setting a minimal ratio of lending to the real economy (non-real estate).** While the previous policy suggestions directly affect the demand side for credit, the present policy suggestion focuses on the supply side, at the level of individual financial institutions (e.g. banks): it could be beneficial to consider the possibility to set a minimum ratio for banks' balance-sheet regarding the portion of lending to the real economy, as this would help to channel funds toward productive activities.

Studying the possibility of setting a maximal level of intra-financial leverage. Financialization can amplify the propagation of financial distress along chains of exposures among financial institutions on multiple instruments (e.g. loans, bonds, equity holdings and derivatives). It is therefore crucial that supervisors proactively monitor intra-financial leverage, both at the individual level and at a system-level in the EU, as a critical factor to inform early-warning systems for financial instability (see Battiston et al. 2016 a,b; Bardoscia et al, 2017). Moreover, policy makers should study the possibility of introducing a cap on intra-financial leverage, in addition to the cap on total leverage already existing in the Basel III framework.⁸

⁸ As in the much of economic literature, leverage is defined here as the ratio of total asset over equity and interbank leverage is defined as interbank exposure over equity. Notice that in the Basel III framework the "leverage ratio" is defined instead as equity over total assets.

REFERENCES

1. Abbate Cosimo and Sapio Sandro (2016) "Gazelles and muppets in the city: stock market listing, risk sharing and firm growth quantiles". *ISIGrowth Working Paper Series* (33A/2016).
2. Alvaredo Facundo, Chancel Lucas, Piketty Thomas, Saez Emmanuel, Zucman Gabriel (2018). "World Inequality Report 2018".
3. Assa, Jacob (2012) "Financialization and its consequences: The OECD experience". *Finance Research* 1.1.
4. Bardoscia Marco, Battiston Stefano, Caccioli Fabio and Caldarelli Guido (2017) "Pathways towards instability in financial networks". *Nature Communications*. 8 (2017): 14416.
5. Battiston Pietro and Napoletano Mauro (2017) "Growth and financial exposition in times of crisis". *ISIGrowth Working Paper Series* (23/2017).
6. Battiston, Stefano, et al. "The price of complexity in financial networks." *Proceedings of the National Academy of Sciences*, 113.36 (2016): 10031-10036.
7. Battiston, Stefano, et al. "Complexity theory and financial regulation." *Science*, 351.6275 (2016): 818-819.
8. Dawid, Herbert and Harting Philipp and van der Hoog Sander (2018) "Manager Remuneration, Share Buybacks and Firm Performance". *ISIGrowth Working Paper Series* (02/2018).
9. Dosi Giovanni (1990) "Finance, innovation and industrial change". *Journal of Economic Behavior and Organization*, 13(3): 299–319.
10. Dosi Giovanni, Revest Valerie and Sapio Sandro (2016) "Financial regimes, financialization patterns and industrial performances: preliminary remarks". *ISIGrowth Working Paper Series* (22/2016).
11. Epstein Gerald (2005) "Financialization and the World Economy". *Edward Elgar Publishing*.
12. Kotnik Patricia, Slavec Alenka, Guduras Dejan and Sakinc Mustafa Erdem (2017) "Executive compensation in Europe: realized gains from stock-based pay". *ISIGrowth Working Paper Series* (07/2017).
13. Krippner Greta (2005) "The financialization of the American economy". *Socio-Economic Review*, 3 (2): 173-208.
14. Fagiolo Giorgio, Giachini Daniele and Roventini Andrea (2017) "Innovation, Finance, and Economic Growth: An Agent-Based Approach". *LEM Working Paper Series* (2017/30).
15. Granier Caroline, Revest Valerie and Sapio Sandro (2017) "How do financial markets adapt? An institutional comparison between European and Japanese Junior stock markets". *ISIGrowth Working Paper Series* (11/2017).
16. Guerini Mattia, Moneta Alessio, Napoletano Mauro and Roventini Andrea (2017) "The Janus-faced nature of debt: results from a data-driven cointegrated SVAR approach". *Macroeconomic Dynamics* (forthcoming). Previously, *ISIGrowth Working Paper Series* (01/2017).
17. Kus Basak (2012) "Financialization and Income Inequality in OECD Nations: 1995-2007". *The Economic and Social Review*, 43 (4): 477-495.
18. Lazonik William (2017a) "The function of the stock markets and the fallacies of shareholder value". *ISIGrowth Working Paper Series* (14/2017).

19. Lazonik William (2017b) "The value-extracting CEO: how executive stock-based pay undermines investment in productive capabilities". *ISIGrowth Working Paper Series* (15/2017).
20. Lazonik William and Mazzucato Mariana (2013) "The risk-reward nexus in the innovation-inequality relationship: who takes the risks? Who gets the rewards?". *Industrial and Corporate Change*, 22 (4): 1093-1128.
21. Lin K-H, Tomaskovic-Devey D (2013) "Financialization and US income inequality, 1970-2008". *American Journal of Sociology* 118: 1284–1329.
22. Lucchese Matteo, Nascia Leopoldo and Pianta Mario (2016). "Industrial policy and technology in Italy". *Economia e Politica Industriale* 43 (3): 233-260. Previously: *ISIGrowth Working Paper Series* (02/2016).
23. Mazzucato Mariana and Penna Caetano (2015a). "Beyond Market Failures: The Market Creating and Shaping Roles of State Investment Banks," *Economics Working Paper Archive wp_831*, *Levy Economics Institute*.
24. Mazzucato Mariana & Penna Caetano (2015b). "The Rise of Mission-Oriented State Investment Banks: The Cases of Germany's KfW and Brazil's BNDES," *SPRU Working Paper Series 2015-26*, *SPRU - Science and Technology Policy Research, University of Sussex*.
25. Marin Giovanni and Vona Francesco (2017) "Finance and the Misallocation of Scientific, Engineering and Mathematical Talent". *ISIGrowth Working Paper* (forthcoming).
26. Meyer Henri and Grussenmeyer Patrick. (2015). "Financial assistance measures in the EA from 2008 to 2013: statistical framework and fiscal impact". *ECB Statistical Paper Series* (7/2015).
27. Neely, Christopher J. (1999) "An introduction to capital controls". *Federal Reserve Bank of St. Louis Review*, 81 (6): 13–30.
28. Sakinc Mustafa Erdem (2017) "Share repurchase in Europe. A value extraction analysis". *ISIGrowth Working Paper Series* (16/2017).
29. Stolbova Veronika, Battiston Stefano, Napoletano Mauro and Roventini Andrea (2017) "Financialization of Europe: a comparative perspective". *ISIGrowth Working Paper Series* (22/2017).
30. Stolbova Veronika, Monasterolo Irene, Battiston Stefano, "A Financial Macro-Network Approach to Climate Policy Evaluation", *Ecological Economics*, 149, pp. 239–253. doi: <https://doi.org/10.1016/j.ecolecon.2018.03.013>.

PROJECT IDENTITY

PROJECT NAME	Innovation-fuelled, Sustainable, Inclusive Growth (ISIGrowth)
COORDINATOR	Giovanni Dosi Institute of Economics, Scuola Superiore Sant'Anna, Pisa, Italy. Email: giovanni.dosi@santannapisa.it
CONSORTIUM	Columbia University – IPD – New York City, U.S.A. OFCE Sciences Po – SPO – Nice, France Scuola Superiore Sant'Anna – SSSA – Pisa, Italy Universitaet Bielefeld – UNIBI – Bielefeld, Germany Universitaet Zürich – UNIBI – Zürich, Switzerland University College London – UCL – London, UK University of Sussex – UOS, Brighton, UK Univerza Ljubljani – UL – Ljubljana, Slovenia
FUNDING SCHEME	Horizon 2020 Framework Programme for Research and Innovation (2014-2020) , Societal Challenge 6 – “Europe in a changing world: inclusive, innovative and reflective societies”. Call Overcoming the Crisis: New Ideas, Strategies and Governance Structures for Europe (H2020-Euro-2014-2015/H2020-Euro-Society- 2014)
DURATION	May 2015 – April 2018 (36 months).
BUDGET	EU contribution: 2,498,610.00 €.
WEBSITE	http://www.isigrowth.eu
FOR MORE INFORMATION	Contacts: Giovanni Dosi, giovanni.dosi@santannapisa.it Andrea Roventini, andrea.roventini@santannapisa.it