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Financial structure and income inequality

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ABSTRACT

We empirically investigate whether financial structures affect income inequality. Using panel data for 97 economies covering above two decades preceding the FinTech surge we uncover a non-monotonic relationship. More finance reduces income inequality up to a certain point, beyond which inequality rises if finance expands via market-based financing, while it does not when finance grows via bank lending. The finance-inequality relationship is not structurally affected by the occurrence of crises, while it is reinforced in countries featuring a higher degree of financial openness. Financial deepening always reduces inequality when it takes the form of improved financial access.

1. Introduction

This paper tries to answer four specific questions: i) does financial development (in terms of depth, efficiency and access) affect inequality?; ii) does the financial structure (the mix of bank- vs market-provided funds) change the finance-inequality relationship?; iii) is the relationship non-linear (below vs beyond a certain threshold)?; and iv) does this non-linearity differ for bank- vs market-provided finance?

Answering these questions is particularly relevant because inequality constitutes a highly relevant topic of public policy in both advanced and developing countries. Growing income and wealth disparity, especially within major advanced economies, has raised concerns about its economic and social consequences (Piketty, 2014; Atkinson, 2015; Furceri and Loungani, 2018). This debate has been reinvigorated by the Covid-19 pandemic which has hit lower income and wealth classes more severely (Ahmed et al, 2020; Brown and Ravallion, 2020; Clark et al., 2020; Deaton, 2021; Yonzan et al., 2021).

In theory, financial development should enhance growth by improving the efficiency of capital allocation and by relaxing borrowing constraints (Levine, 2005). However, this disregards the issue of which part of society benefits from the growth enabled by financial development. Moreover, very little is known about the link between different types of financial development and inequality. Finance-induced growth may be pro-poor by expanding employment opportunities, but it may also favour entrepreneurs and their profit margin. The relationship between inequality and development was pioneered by Kuznets (1955), who established the inverted U-shaped path of income inequality along economic development (Kuznets

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curve). At the industrial take-off, Kuznets argued, mean incomes and their dispersion are lower in rural vis-à-vis urban areas. So, urbanization raises inequality. But, as new generations of rural people migrate to cities, they can profit from urban opportunities. The wages of lower-income groups rise, narrowing overall inequality. Kuznets' argument of urban opportunities requires financial development, enabling formerly poor migrants to finance their education and build their own businesses – regardless of inherited wealth or lack of it.

Three theoretical landmark papers explaining the finance-inequality nexus are Banerjee and Newman (1993), Galor and Zeira (1993), and Greenwood and Jovanovic (1990). Whereas the first two predict that better developed financial markets will reduce income inequality, the latter foresees an inverted-U-shaped relationship between financial development and inequality. In fact, in the early stages of financial development – when only a small part of society benefits – income inequality increases. However, after a certain stage of financial development is reached, more finance helps reducing income inequality. While the theoretical channels are not thus clear, the key reason why higher financial development – at least after a certain stage – reduces income inequality is always that better credit availability allows more household choices and decisions to be based on better allocation of spending over time, free from inherited wealth.

More recently, instead, some theoretical models started addressing ways in which finance may help to increase income inequality by enlarging rent extraction. Rent may be extracted in various ways. Among them, Korinek and Kreamer (2014) develop a model by which financial deregulation raises inequality. Various models tackle the issue of harmful or inefficient financial innovation (Gennaioli et al., 2012; Thakor, 2012; Bolton et al., 2016b), which determines rent extraction by agents and induces more unequal income and wealth distribution. And inequality may worsen also when employees enjoy rent-sharing arrangements with the companies they work for where these have become large exporting companies thanks to the support of better access to external finance (Ehrlich and Seidel, 2019).

In turn, early empirical studies tended to find that financial development improves the income of the poor, especially in developing countries (see, amongst others, Demirgüç-Kunt and Levine (2009) for an extensive review and Burgess and Pande (2005) for the Indian case). It appears that banks' finance is more efficient than markets' finance at the early stage of development because the institutional background is too underdeveloped to support market activities (Gerschenkorn, 1962). But there are also potential problems related with a growing and monopolistic banking sector which can give rise to distortionary effects. In this case, markets can give alternative forms of financing that could enhance efficiency and foster economic growth (Boyd and Smith, 1998). However, when markets become too big, their complexity as well can yield possible distortions. Using information on a large number of countries, Clarke et al. (2006) and Beck et al. (2007) test the different theories and support the prediction of a linear inequality-reducing influence of financial development. However, in line with the theoretical model of Greenwood and Jovanovic (1990), Kim and Lin (2011) find that the benefits of financial depth only manifest if the country has reached a threshold level of financial development.

Yet recent empirical works, such as Jaumotte et al. (2013), Jauch and Watzka (2016), de Haan and Sturm (2017), Kaidi and Mensi (2020) find that more finance increases income inequality, especially if one expands the database also to advanced economies and more recent data.[1] The idea is gaining support that, above a certain threshold, financial development could benefit higher wage classes more extensively (eg Chakroun, 2020). In particular, inequality could rise also due to the booming remuneration of senior executives (Kay, 2015). Rajan (2010) indicates that wage stagnation and rising income inequality in the United States prior to the Global Financial Crisis (GFC) encouraged low/middle-income households to increase their indebtedness as a way of maintaining their consumption levels. Higher indebtedness, in turn, increased income transfers from constrained households to the wealthier, i.e. the funds providers, further exacerbating inequality.

We extend the literature on the inequality-finance nexus by investigating for 97 advanced and emerging market countries the possibility of a non-linear impact of financial development along three dimensions (depth, efficiency and access) and two different types of financial development (banks versus markets). Moreover, we shed new light on the relationship considering a number of key institutional and economic factors that could alter the inequality-finance nexus: legal origin, economic freedom, financial transparency, financial crises, foreign direct investment, and financial access.

As for the first question – does financial development affect inequality? – Section 4 expands the discussion of the existent theoretical predictions and empirical findings. Since a consensus is lacking among the various theoretical contributions on the shape of the financial development-inequality relationship, empirical explorations become essential. That is why our empirical analysis augments the empirical investigation by considering a long-run span and by including almost one hundred developed and emerging countries.

Next, to answer the second question – does the financial structure (the mix of bank- vs market-provided funds) change the finance-inequality relationship? – we move beyond a single measure of financial development by allowing different types of finance to affect the finance-inequality nexus differently. Indeed, reliance on bank- vs market- financing may have different implications here in view of, eg: limited capital market participation vs universal participation in banking, varying degrees of competition in financial market services vs banking, the fact that financial markets (mostly) trade on public information while banks rely (also) on private information, and the fact that formal contracting usually prevails for financial mar-

[1] De Haan et al. (2018) also find that financial development strengthens the inequality-raising impact of financial liberalization. See also Furceri et al. (2019), who propose that financial globalization led on average to limited output gains while contributing to significant increases in inequality. In turn, Bittencourt et al. (2019) uncover that financial development associates with heightened inequality across the 50 US states. Somewhat different results are obtained by Chiu and Lee (2019) and Altunbaş and Thornton (2019) who find that financial development may contribute to lower income inequality in developed countries while furthering more inequality in developing countries.

ket services, while banks may employ (also) informal contracts – such as in relationship lending. For this reason, we investigate the link between financial development and income inequality distinguishing bank- vs market- financing.[2]

To tackle the third question – is the relationship between finance and inequality non-linear? – we consider a more general set up that allows the possibility for the finance-inequality nexus to change below vs beyond a certain threshold.[3] As already hinted above and further discussed in Section 4, some theories predict a linear (monotonic) shape of the link, while others envisage a non-linear shape whose sign changes at certain thresholds. Also, among the latter theories, some foresee that more finance reduces (raises) inequality before (after) the threshold – a beneficial-to-detrimental pattern – while others expect that more finance, especially at the very early stage (at later stages) of development, raises (reduces) inequality before (after) the threshold – a detrimental-to-beneficial pattern.

To answer the fourth question – does this non-linearity differ for bank- vs market-provided finance? – we allow the shape of the finance-inequality relationship to differ for bank- vs market-financing. A relevant consideration here is the way in which credit intermediation is moving away from the banking sector to the debt securities market. However, most of the experience with macroprudential tools to date has come from banking. For instance, if the beneficial-to-detrimental pattern applies to market-finance but not to bank-finance, this would call for a better knowledge by policy makers as to which measures could be taken to address the build-up of financial excesses that originate from outside the banking system (Cizel et al., 2016).

The main result of the paper is that more finance (both bank- and market-based) reduces income inequality but only up to a point. Beyond that point, income disparity rises if finance is expanded via market-based financing, while it does not rise significantly when finance grows via bank lending. Thus, our findings support the view that the beneficial-to-detrimental pattern applies only to financial market-financing but not to banks.[4]

We also shed new light on the finance-inequality relationship considering three key factors: crises, foreign direct investment (FDI), and financial access. First, we find that the relationship between financial structure and income inequality is not structurally affected by the occurrence of crises. On the contrary, the finance-inequality relationship seems to be reinforced in countries that receive large flows of FDI while financial deepening always reduces inequality when it takes the form of improved financial access.

A caveat is in order. The possibly complex relationship between finance and inequality may have taken a new twist with the sudden surge of the FinTech sector in the latest decade. In particular, contrary to the previous situation of largely rent-seeking and inequality-increasing financial innovations, the advent of FinTechs may have improved financial inclusion and through that may have contributed to reduce income inequality (Cornelli et al., 2020; Demir et al., 2020). Unfortunately, data limitations on FinTech credit (and more generally on non-bank financial intermediation), available only for more recent years and a limited number of countries, prevent us to extend the analysis to the last decade.

The remainder of the paper is organized as follows. Section 2 presents cross-country information of our main variables of interest, while Sections 3 and 4 summarize the existing literature on the determinants of financial development and its relationship with inequality. The econometric results are presented in Section 5. Robustness checks and additional tests on transmission channels at work are discussed in Section 6. The last section concludes discussing also some policy implications of our results.

2. Data

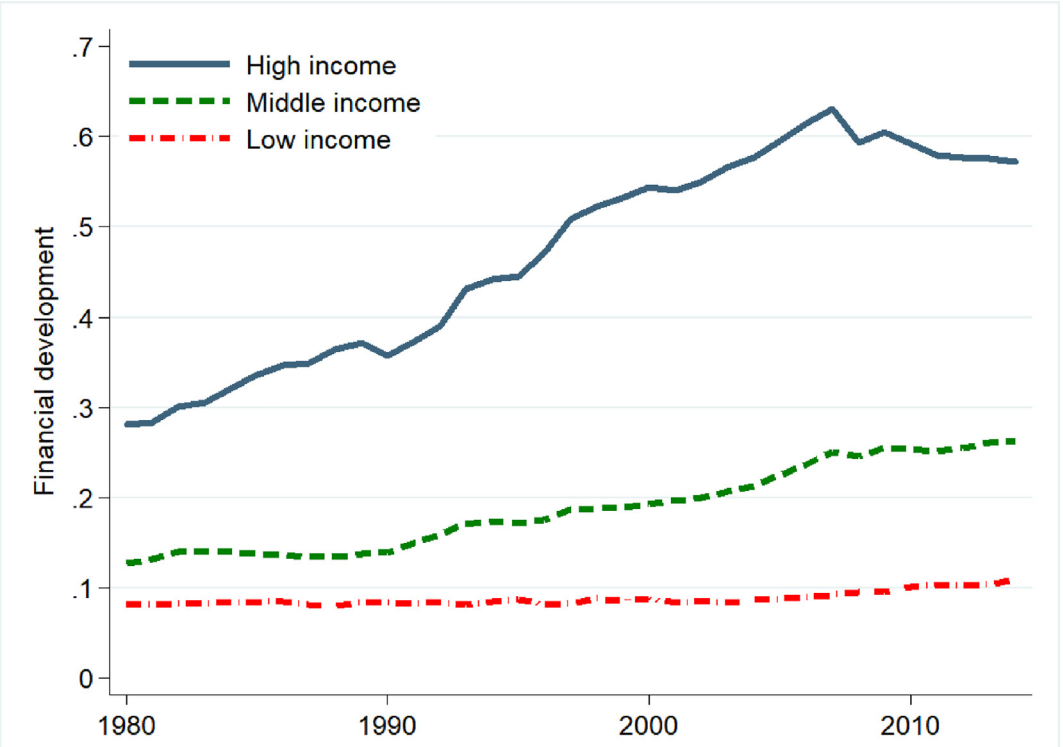
As an aggregate measure of financial development, we use the index provided by Svirydzenka (2016). This study creates nine indices that summarize how developed financial institutions and financial markets are in terms of depth, access and efficiency. These indices are then aggregated into an overall index of financial development (FD). The evolution of the FD index over the sample period shows that financial development has progressed quite noticeably in both advanced economies and emerging markets. However, the gap between the two groups of countries widened significantly between the mid-1990s and early 2000s (see Graph 1). As indicated by Svirydzenka (2016), this gap reflects a period of rapid credit growth in the advanced economies' financial systems.

One should note that the coverage of the FD index by Svirydzenka (2016) is limited in the eighties and nineties and it is not clear how one should treat missing values of particular subcategories when constructing the index (e.g. the financial access index only started to be collected in 2004, see Table 3 in Svirydzenka (2016)). For this reason, when it comes to distinguishing between the intermediation services that banks and financial markets provide, we rely on more standard indicators that approximate different aspects of the two intermediation channels: bank credit, equity and bond market capitalization (Beck et al., 2000; Levine, 2005).

[2] Allen et al. (2018) investigate the impact of financial structure on economic growth and find that (i) it depends on the overall economic development and institutions' characteristics and (ii) market-based systems have an advantage for financially dependent industries in good times but are a disadvantage in bad times. Gambacorta et al. (2014) find that up to a point, banks and markets foster economic growth, while above they do not. Luintel et al. (2008) point to the importance of information asymmetries (both moral hazard and adverse selection) in determining how financial markets and financial institutions affect economic growth (see also Choudhary and Jain (2017) on adverse selection and relationship lending).

[3] On different grounds, Arcand et al. (2015) find that finance starts having a negative effect on output growth when credit to the private sector reaches 100% of GDP. See also Cecchetti and Kharroubi (2012) as well as Benczur and Kvedaras (2020).

[4] Our results are consistent with those reported by Tan and Law (2012) for developing countries, while they contrast with those of Seven and Coskun (2016) who do not find a significant finance-inequality nexus.



Graph 1. Financial development over time. Note: The graph shows unweighted averages of the Financial Development Indicator across high income, middle-income and low-income countries. A high-income country is defined according to the World Bank classification as of 2012 with a gross national income per capita above US$12,476 calculated using the Atlas method. Low- and middle-income countries are the remaining countries. Sources: Svirydzenka (2016); authors' calculations.

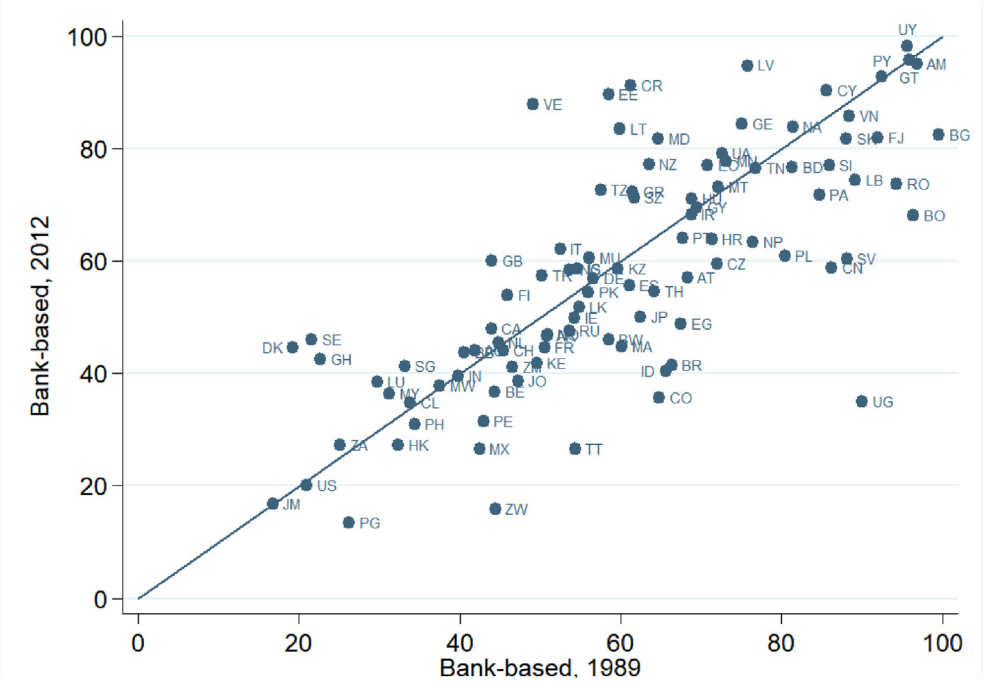
Graph 2 depicts the financial structure for 97 countries and two years: 1989 (or the first non-missing observation in our database) and 2012. It plots the ratio of bank credit to the sum of bank credit plus total equity and bond market capitalization – a proxy for the relative importance of banks and markets. The higher this ratio, the greater is the importance of banks and, consequently, the smaller that of markets in a financial system.

Two patterns emerge. First, financial structure differs considerably across countries. The relative importance of banking ranges from 16 % in Papua New Guinea to almost 100 % of GDP in Uruguay. Empirically, the origin of a country's legal framework has been shown to affect the composition of its business financing. Firms in common law countries tend to rely more on traded equity and have a more diffuse shareholder base than firms in countries that follow the French civil law tradition. Moreover, a correlation emerges between a country's legal origin and its overall financial development. Common law countries outperform civil law ones with more developed financial systems (La Porta et al., 1997; Beck et al., 2001).

Second, financial structure is dynamic. Market-based intermediation gained ground between 1989 and 2012. Indeed, most countries lie below the 45-degree line that identifies shifts of the financial structure from bank- to market-based, mostly reflecting changes in emerging market economies.

Another interesting stylized fact shown in Graph 3 is the positive trend in income inequality in high-income countries prior to the Global Financial Crisis (GFC), which seems at odds with the inverted U-shaped relationship between economic development and inequality along the Kuznets curve. Instead, inequality is more stable, albeit on a higher level, in the low- and middle-income countries, where income structures have converged as evidenced by the decrease of inequality dispersion over time.[5] In response to the GFC, we observe an important drop in the Gini coefficient in advanced economies back to levels observed in the early 2000s. Moreover, the disparity between income inequality has been decreasing over time, as suggested by the narrowing quartiles of the distribution of the Gini coefficient in both high- and lower-income countries. This confirms the World Bank (2016) report on poverty observing that the number of countries experiencing declining inequality was twice the number of those exhibiting widening inequality during 2008 and 2013.

[5] As Bourguignon (2017) points out, globalization and skill-biased technological progress coupled with stagnant wages and employment of unskilled labour can partly explain the rise in the capital share of total income in advanced countries (see also Acemoglu (1998). In developing countries, the expansion of North-South trade should instead benefit labour and hurt capital, thus contributing to less inequality.



Graph 2. Ratio of bank credit to total private sector funding. Note: The ratio of bank credit is expressed as a percentage of the sum of bank credit plus bond and equity market capitalisation. A higher value of the indicator suggests financial structure that is more bank-oriented. For close to half of the countries, data for outstanding bonds issued by the private sector (bond market) are not available. In this case, we assumed that the bond market is negligible. A dot that is below (above) the 45 degree line indicates that a particular system became more (less) market-oriented in 2012 compared to the initial value in 1989. Source: World Bank World Development Indicators; authors' calculations.

3. Financial development, financial structure and country characteristics

What accounts for the differences in countries' financial development and their evolution through time? What drives cross-country variability in financial structure? What is the influence of real sector characteristics, such as the level of economic development or the sectoral composition of economic activity? And what is the role of institutional factors such as the legal framework? We discuss these issues by drawing on the literature and using cross-country sectoral information.

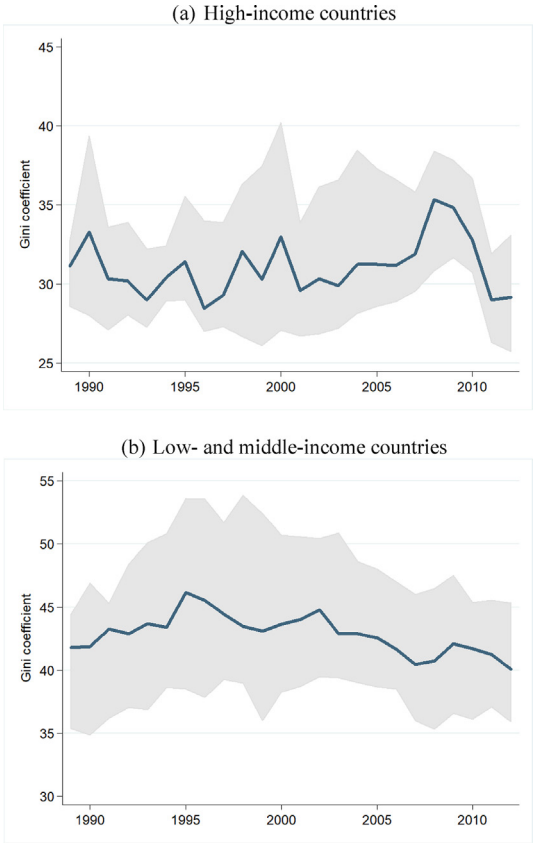
There is a general tendency for more economic affluent countries to also show higher degrees of financial development. However, the variability of the financial development indicators among nations is relatively large even after accounting for their diverse levels of economic development. Moreover, the development of banks and markets is quite heterogeneous across countries.

Generally, higher per capita GDP tends to coincide with more market-based financial intermediation.[6] Several economic factors may explain this. One is that the financial literacy of households and firms improves with economic development, leading to higher demand for services linked to market-traded securities (Allen and Gale, 2000; Boyd and Smith, 1998). For instance, insurance companies, pension funds and mutual funds have a larger share of GDP in richer countries. Another may be that more developed countries have stronger institutions. Better enforcement of property rights and effective investor protection through a reliable legal and judicial framework tend to favour market-based financial development (see discussion below).

But differences in financial structure also reflect the sectoral composition of output. Some productive sectors are more likely to rely on bank loans as a source of external funds. By their very nature, different lines of business are more suited to different types of intermediation. Sectors with tangible and transferable capital (such as agriculture), as well as those where output is easier to pledge as collateral (such as construction), are more amenable to bank debt finance. By contrast, sectors that rely heavily on human capital (eg professional services) or whose output is hard to collateralise (eg intellectual property rights) will tend to rely more on equity or bonds. In the empirical part, when we analyse the link between inequality and financial structure, we need therefore to control for the share of industrial production.

Turning to countries' institutional characteristics, the ability to design effective financial contracts depends on the quality of the legal framework and the enforcement of contracts and property rights. Investors are more likely to part with their money if they are more confident they will be able to claim it back. The literature on the interaction between law and finance

[6] See Levine and Zervos (1998) and Demirgüç-Kunt and Levine (2001).



Graph 3. Development and income inequality. Note: Median, 25 and 75 percentile values are shown. Source: UNO-Wider WIID3.3, Standardized Income Inequality Database. Authors' calculations.

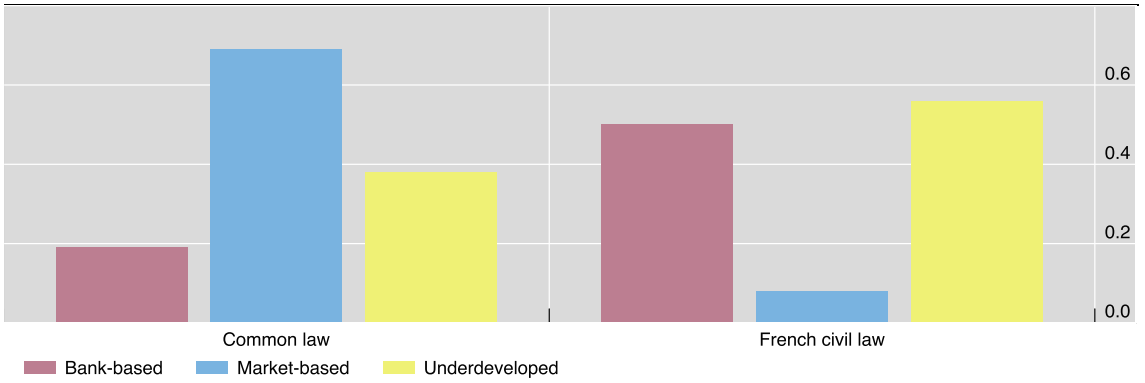
has highlighted a number of regularities.[7] First, legal systems originating in the common law tradition tend to offer higher protection to holders of equity and debt securities (La Porta et al., 1998). Common law systems afford the highest legal shareholder protection to the extent that shareholders have more direct rights to participate in the decision-making process of firms compared to civil law systems (eg vote by mail, unrestricted share sale and special minority laws). Second, common law systems also support a better creditor protection, which is essential for debt finance. In particular, creditors have more rights to avoid an automatic stay on assets, enjoy greater priority when their claims are secured, and face managements that have less freedom to seek court protection.

As a result of higher shareholder and creditor protection, common law systems foster the development of market-based finance (bonds and stocks), as it depends on the efficiency of arm's length relationships between issuers of securities and investors. By contrast, through banks' repeated interaction with clients and closer screening and monitoring of borrowers, bank-based finance would be favoured in civil law systems since the acquired information compensates the lower creditor protection. Legal systems in German and Scandinavian civil law tradition fall between common law and French civil law in the ranking of creditor and shareholder protection (La Porta et al., 1998).

Another strand of the law and finance literature has emphasized that legal systems and traditions differ in the way (i) they favour private property over the rights of governments and (ii) they are formalized and adaptable to changing environments (Hayek, 1960). Since common law systems are more flexible than their civil law counterparts with more limits on government intervention, financial development would tend to be higher (Merryman, 1985; La Porta et al., 1999; Mahony, 2001). Bank-based financial development would again be favoured in civil law countries where banks can acquire relationship advantages that compensate for lower creditor protection.

Empirically, there is a strong association between the origin of the legal framework in a country and the composition of business financing. Firms in common law countries tend to rely more on traded equity and have a more diffuse shareholder base than firms in countries that follow the French civil law tradition (magenta and blue bars in Graph 4). In addition, there is a correlation between the origin of the legal system in a country and the overall development of its financial system. As

[7] See La Porta et al. (1998), Giannetti (2003), Bancel and Mittoo (2004), Beck and Levine (2005), DeJong et al. (2008) and Fan et al. (2010).



Graph 4. Determinants of financial structure: legal origin[1]. Note: The figures are computed using the information in Table 3.13 in Demirgüç-Kunt and Levine (2001). The height of each bar represents the share of countries within each category (underdeveloped, bank-based and market-based financial system) that corresponds to countries with the specific legal origin. Financial structure in each country is classified as underdeveloped when it scores below the cross-country median in terms of both bank and market development indicators. Countries are classified as bank-based or market-based if they are respectively below or above the mean value of a financial market structure indicator. The latter is constructed as a simple average of three ratios: capitalisation/bank assets, trading/bank credit, and trading/overhead cost. Higher values of the financial market structure index mean a higher degree of stock market development relative to the development of the banking system. Countries are divided into three groups depending on the origins of their legal system: common law, French civil law and other civil law (not shown). Source: Demirgüç-Kunt and Levine (2001).

shown by the yellow bars in Graph 4, common law countries tend to have more developed financial systems than countries with legal systems based on the French civil law.

4. How could financial development affect inequality?

There is considerable evidence that financial deepening contributes to less poverty and inequality, even though theoretical work provides conflicting predictions (Claessens and Perotti, 2007). A number of models imply that financial development enhances growth and reduces inequality. It has been argued that financial imperfections, such as information and transactions costs, affect particularly the poor who lack collateral and credit histories. Thus, it is likely that abating credit constraints will benefit the less-privileged, enhance the efficient allocation of capital and reduce income inequality through increased credit availability of poor individuals with productive investments (Galor and Zeira, 1993; Aghion and Bolton, 1997; Galor and Moav, 2004). In other words, financial development should benefit the poor both by improving the efficiency of capital, and thus economic, allocation and by alleviating credit constraints which disproportionally restrain the poorer parts of society, thereby reducing income inequality.

Conversely, other theories predict that financial development primarily benefits the wealthier parts of society. This view is based on the idea that poorer individuals rely on informal (family) connections for fund raising, which means that a larger formal financial sector more extensively benefits the privileged. For instance, the model developed by Greenwood and Jovanovic (1990) predicts a nonlinear relationship between financial development and income inequality that depends on the level of economic advancement. In their model, financial development helps improve the allocation of capital, generates economic growth, and thus helps the poor – independent of the stage of economic development. The distributional effect of financial development, however, depends on the level of economic development. At low levels of prosperity, only the wealthier parts of society can afford to access and directly benefit from financial development. Only after a certain threshold of economic development, more individuals can access financial markets and thus a larger proportion of society benefits from financial deepening. It is worth stressing that the positive correlation between finance and inequality for very low levels of income is difficult to detect in our database, which has very limited coverage of countries at the early stage of financial development.

More recently, alternative theoretical justifications help to understand the link between finance and inequality in more advanced and financially developed economies. Stiglitz (2015) argues that the excessive remuneration of management and lenders' rent extraction may have been at the centre of the recent increase in inequality observed in a number of rich countries. This theory seems to postulate that any link between more finance leading to more inequality might have asymmetric underpinnings across the financial structure and the distribution of income. First, market finance more than bank finance might be the culprit. Second, the derived increase in inequality could lie in the increased share at the top of the income distribution.

4.1. Rent seeking and top incomes

There is mounting evidence that a major driver of the recent increase in income inequality has been the high growth in the top incomes and rents of the financial sector. As evidenced by Philippon and Reshef (2012) compensations surged in the

financial industry prior to the 1930s and during 1993–2006. The wage premium in finance vs other sectors further widened after the great financial crisis (Graph 5). Philippon and Reshef (2012) argue that financial deregulation is the main culprit of both demand for skill and high wages in the US financial sector, along with other factors including technology, non-financial corporate activity, and financial globalization, which play a secondary role.[8] The results thus suggest that the increase in relative wages in finance is neither driven by faster growth in the cost of skilled labour, increased relative skill-intensity, nor by compositional changes within the group of skilled workers. Greenwood and Scharfstein (2013) show that fee income is a major driver of modern finance, particularly raising asset management fees and fees associated with the household credit boom. However, we should note that increasing wage gaps prevailed also outside the financial industry. In the United States, for example, the CEO-to-worker compensation ratio increased from roughly 20-to-1 in 1965 to beyond 400-to-1 at its peak in 2000 (Mishel and Sabadish, 2012).

The increasing income share of finance has also been attributed to other factors. Korinek and Kreamer (2014) develop a model by which financial deregulation raises inequality: deregulation boosts financial sector profits in expectation but hurts the real economy via higher volatility and a greater incidence of credit crunches. Various models tackle the issue of harmful or inefficient financial innovation when investors are led to neglect certain unlikely risks (Gennaioli et al., 2012) or could build positive profits for intermediaries at the cost of heightening the risk of future liquidity crises (Thakor, 2012). In turn, this type of financial innovation could lead to rent extraction and more unequal income distribution. Axelson and Bond (2015) argue that many finance jobs entail the risk of large losses, and hard-to-monitor effort. Using a model with optimal dynamic contracting, they show that finance jobs feature high compensation, up-or-out promotion, and long work hours. Bolton et al. (2016b) argue that the financial industry extracts excessive rents because it acquires costly information to purchase good assets in opaque (OTC) markets. In such environments, uninformed investors only have access to a restricted pool of assets and, for a given quality composition of assets for sale, there is too much information acquisition and the financial industry extracts excessive rents. In a similar vein, Kalyta (2009) suggests that more opaque forms of compensation, such as pensions, are most vulnerable to managerial rent extraction. Focussing on wage differences across bankers and traders, Glode and Lowery (2016) propose a labour market model in which financial firms compete for a scarce supply of workers who can be employed as bankers or traders. While hiring bankers helps create a surplus that can be split between a firm and its trading counterparties, hiring traders helps the firm appropriate a greater share of that surplus away from its counterparties. As a result, traders earn more than bankers. In Glode et al. (2012), an "arms' race" can occur as agents try to protect themselves from opportunistic behaviour by (over)-investing in financial expertise.

Another strand of the literature focuses on the impact of the too-big-to-fail status of some major banks. To the extent that such banks enjoy an implicit state guarantee, they are in effect subsidised by taxpayers which allows them to extract larger rents than observed in non-financial corporations of similar size (Baker and Mc Arthur, 2009; Santos, 2014).

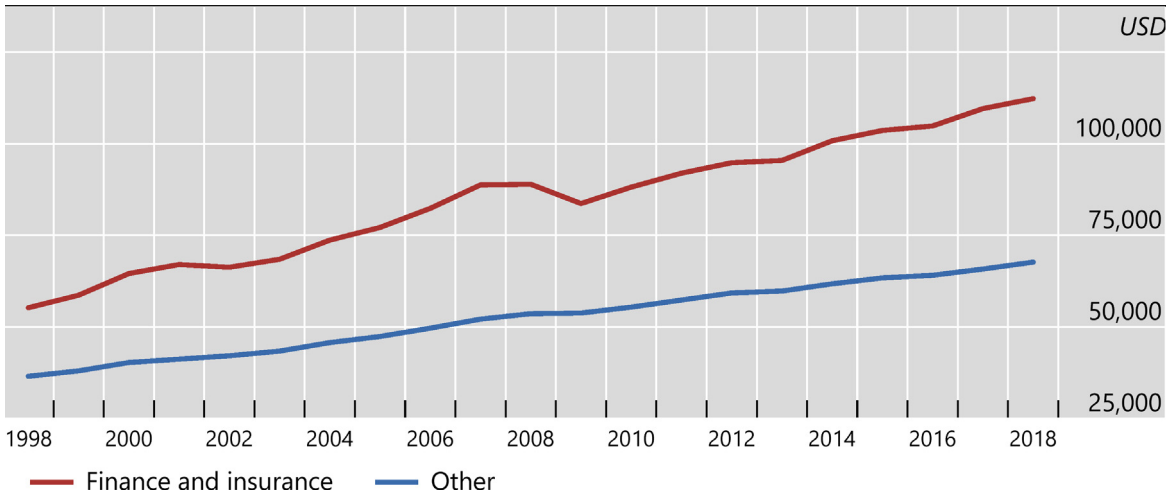
4.2. The increase in rents

More generally, the developments in financial markets might have contributed to widen the divide between the well-off and the others by helping the former to extract more rents. Although, strictly speaking, this refers more to wealth inequality than income inequality, there is evidence that the two are typically related with wealth being more unequally distributed than income (Heathcote et al., 2010; Kopczuk, 2015; Saez and Zucman, 2016).

Namely, Stiglitz (2016) proposes that much of the debate around inequality is biased by theoretical failures to capture new forms of income appropriation related to wealth as a measure of control over resources. Specifically, Stiglitz identifies a series of factors that might explain what he labels "wealth residuals" (the component of the wealth-income ratio that cannot be explained by savings). The list of factors potentially raising rent-originated incomes and wealth include: (i) rents on scarce land and other non-produced assets (partly due to rising urbanization); (ii) market power and exploitation (rents related to market manipulation, insider trading, and other predatory and discriminatory practices); (iii) other forms of exploitation of consumers (by having corporations exploit consumers' behavioural irrationalities); (iv) rent-seeking in transfers from the public to the private sector (referring to the implicit subsidy of too-big-to-fail banks); (v) knowledge and informational rents (like insider trading and market manipulation due to differential access to information); (vi) intellectual property shares (in part due to the phenomenon of "enclosure of the knowledge commons", see Boyle (2003)); and (vii) sensitivity to discount rate and risk management (lower interest rates and higher certainty equivalents). While financial development is directly ingrained with factors (ii), (iv) and (v), it likely impinges on most of the other factors as well. Therefore, Stiglitz's argument suggests that financial development might boost rents and, through that, also income inequality.

There are good reasons to believe that such forms of income appropriation are more likely to occur with the development of financial markets than with financial development based on banks. This view is grounded on a few considerations differentiating banks and financial markets. First, even though deregulation and changes in business models pushed many banks to move towards transactional or arm's length banking, relationship banking seems to still play an important role. This is supported by both theory (eg Boot and Thakor, 2000) and empirical evidence (Mester, 2007; Beck et al., 2017; Bolton et al., 2016a). In turn, relationship banking may directly reduce rent-seeking incentives and financial exclusion (Beck

[8] Tanndal and Waldenström (2018) find that the "Big Bang" financial deregulations in the UK in 1986 and in Japan in 1997–1999 both expanded top income shares. On the contrary, Manish and O'Reilly (2018) find that banking supervision regulation is associated with greater income inequality. They argue that this is consistent with the economic theory of regulation and interpret it as evidence of regulatory capture in the banking and finance industry.



Graph 5. Wage differential between the financial sector and other sectors[1]. Note: US wages per full-time equivalent employee. Source: Bureau of Economic Analysis. Pereira da Silva, Frost and Gambacorta (2019).

et al., 2009), which complex financial market-based services do not (Beaverstock et al., 2013). Second, relationship banking is often adopted by stakeholder-oriented banks (e.g., savings banks, cooperative banks, credit unions, ethical banks), which typically are subject to less profit- and rent-seeking behaviour (eg Cornée and Szafarz, 2014). And third, the link between market development and inequality could be also influenced by financial technology. Using micro data from the Survey on Household Income and Wealth conducted by the Bank of Italy over 1991–2016, Frost et al. (2020) find that financial development and financial technology use both have a positive impact on households' net and financial wealth. This effect increases starkly when moving toward the top of the distribution, in line with the so-called "Matthew Effect" (Merton, 1968), the capacity of wealthy households to achieve higher returns with respect to other households. This effect is further explored by Allen (2012) who argue that financial innovations boosting financial market development have proved exploitative and predatory in nature.

Overall, we might thus expect that, beyond a certain level, financial development might more severely favour income inequality when it is market-based.

4.3. The role of institutions

The way financial development affects inequality depends as well on the quality of institutions that shape the structural characteristics of financial systems. In countries where political participation is skewed, established incumbents may seek to protect their rents by limiting financial access and competition (Claessens and Perotti, 2007). Distinguishing between civil- and common-law countries is important at this juncture. A huge strand of literature has, in fact, argued and documented that financial markets tend to develop more in the countries having a common law legal origin than in those with a civil law background (La Porta et al., 1997, 1998). As discussed above, to the extent that a common law system provides stronger shareholder and creditor protection, it usually promotes market-based development more than a civil law set-up, where banks through their repeated interaction can compensate for the reduced creditor protection. We will need to control for these aspects in the econometric set up.

4.4. The impact of crises, FDI, and financial access

The literature suggests that we should expect some specific effects on the finance-inequality relationship in three particular cases: crises, FDI, and financial access. First, crises might have serious consequences in terms of affecting the finance-inequality nexus. For instance, the OECD (2013) and De Haan and Sturm (2017) find a strong positive effect of financial crises on income inequality. This is presumably due to the fact that crises affect low-income individuals disproportionately because they have fewer hedging possibilities and their work environment is more volatile. Other works have considered the possible reverse causality of this relationship which posits that financial crisis are preceded by growing income inequality, but Bordo and Meissner (2012) do not find any evidence in favour of this view. Second, the intensity of capital flows as approximated by FDI can also impact the finance-inequality relationship. Among others, Lee et al. (2020) show that FDI helps to reduce income inequality by boosting economic growth through transfers of technology and capital deepening that affect negatively the relative return of capital to labour. However, this beneficial effect weakens when a country has reached a threshold level of financial development. Along similar lines, the model proposed by Choi (2020) suggests that integration upstream or downstream along the global value chain crucially depends on the degree of financial development. On the other hand, some

studies provide evidence that openness can have a detrimental effect on inequality by increasing the skill premium (Dabla-Norris et al., 2015; Hasan et al., 2020). Finally, the finance-inequality relationship will likely take different shape depending on whether financial development materializes in financial innovations that promote financial inclusion and access vs rent-seeking financial innovations (Hasan et al., 2020; Frost et al., 2021). On their part, Law et al. (2020) suggest that technological innovation in conjunction with financial deepening can reduce income inequality. By contrast, Boissay et al. (2021) indicate that the entry of large technology companies (big techs) into finance can produce situations of market dominance and data concentration with uncertain effects on income distribution.

5. Empirical analysis

Our primary measure of inequality is the Gini coefficient defined on disposable income, including cash transfers (such as remittances).[9] Depending on the country, it can either be equivalized or per capita for a given household (the latter tends to be used in African, Asian, Middle East and Post-Soviet countries). The term "equivalized" hereby refers to the fact that household income has been made equivalent to that of a single adult. It differs from disposable income per capita by applying a weighting scheme that takes into account that *n* adults living together do not need as much as *n* isolated persons (Bourguignon, 2017). Moreover, in some countries (mainly from Africa and Asia) the calculations are applied to consumption expenditures instead of income depending on how the population surveys have been conducted.[10] Including country-fixed effects to account for any time-invariant differences across the inequality measures is therefore crucial in the econometric analysis. Our work is related to that of Seven and Coskun (2016) who also examine the relationship between finance and inequality (and also poverty) for a large panel of countries that, like ours, distinguishes between bank credit and market finance and also allow the link between GDP and inequality to be non-linear as suggested by some theories. However, there are some important differences compared with our study. First, they use 45 countries, less than half of our sample. Second, the authors estimate the impact on inequality in separate regressions and use a composite measure to gauge the joint impact, whereas we include them side-by-side and allow for non-linear impacts. And third, we explore the role of different dimensions of financial development in terms of depth, efficiency and access. Tan and Law (2012) also share similarities with our approach – eg allowing for a non-linear relationship between financial development and inequality and also splitting financial development between bank credit and market financing – but three main differences remain. First, they consider only 35 developing economies over 1980–2000, a more limited and more distant time frame with respect to ours. Second, they estimate the impact on inequality of bank credit or market finance as separate regressions rather than including both bank credit and market finance in the same regression. Third, they do not allow the link between GDP and inequality to be also non-linear as suggested by prevailing approaches. Our paper is also related to Hasan et al. (2020) who analyse the link between finance and wealth (rather than income) inequality using a Bayesian Model Averaging methodology for a cross section of 73 countries. This study focuses, as we do, on the different dimensions of financial development (depth, efficiency and access) and other economic, political, institutional and geographical factors.

In the first place, we analyse the link between inequality and the aggregate financial development index (*FD*) using a panel of advanced and emerging market economies during the period 1989–2012[11]:

$$Gini_{i,t} = \rho Gini_{i,t-1} + \alpha y_{i,t} + \alpha^* y_{i,t}^2 + \vartheta FD_{i,t} + \vartheta^* FD_{i,t}^2 + \delta \imath X_{i,t} + \psi_i + \varepsilon_{i,t} \quad (1)$$

where $Gini_{i,t}$ is the logarithm of the Gini coefficient,[12] $X_{i,t}$ represents a set of control variables, and *i* and *t* indicate countries and time periods, respectively. The key variables are $y_{i,t}$, the logarithm of GDP per capita, and the financial development indicator, $FD_{i,t}$. We use the aggregate financial development measure ($FD_{i,t}$) constructed by Svirydzenka (2016) and we complement the analysis by considering the impact of its main components (Financial Depth, Access to Finance and Efficiency of Finance) one at the time. We calculated averages of the components across financial institutions and markets, weighted by their relative importance.

In a second step we investigate the link between inequality and financial structure (banks vs markets) using a panel of 97 economies during the period 1989–2012:

$$Gini_{i,t} = \rho Gini_{i,t-1} + \alpha y_{i,t} + \alpha^* y_{i,t}^2 + \beta B_{i,t} + \beta^* B_{i,t}^2 + \gamma M_{i,t} + \gamma^* M_{i,t}^2 + \delta \imath X_{i,t} + \psi_i + \varepsilon_{i,t} \quad (2)$$

[9] The choice to use an income inequality measure rather than a wealth inequality indicator is driven by data coverage considerations: data on wealth inequality are available for a shorter horizon (only from 1995). However, the correlation between available measures of income and wealth inequality (Top 1% and Top 10% of their distribution) for the period 1995–2020 is stable over time and significantly positive (the correlation is between 0.7 and 0.8).

[10] As noted by Bourguignon (2017), the concept using consumption might be preferable as it corrects for income volatility which could introduce a measurement error. However, to the extent that we use five-year averages, the potential measurement bias in the estimations should be minimized.

[11] As discussed above, the coverage of the FD index for the eighties and nineties is limited, particularly for the financial access category. We decided to use this index, as it is reported by Svirydzenka (2016), i.e. assuming that for missing data the subcategories are zero.

[12] The primary data on the Gini coefficient comes from the World Income Inequality Database (UNO-Wider WIID3.3), a collection of country-specific information from many sources. To maximize consistency over time, we used those sources for which the quality rating is high and for which the income concept, equivalence scale and coverage of area, population and age are comparable for a given country. For five countries, we complemented the data with information from the Standardized Income Inequality Database. We also tested if the results changed depending on whether the estimate of inequality is for consumption or income. The results did not change, possibly because only 12% of the sample uses consumption.

where the two indicators of financial structure are: $B_{i,t}$ is the logarithm of the ratio of bank credit to GDP and $M_{i,t}$ indicates the logarithm of the ratio of stock market capitalization to GDP.[13] A potential shortcoming of these two measures is that non-bank financial intermediation is not explicitly taken into account. Moreover, the distinction between banks and markets can be imprecise due to the fact that banks participate in stock markets (as issuers, investors and market traders).

To check whether the relationship between financial development and inequality is non-linear, we insert quadratic terms both in equation (1) for $FD_{i,t}$ and in equation (2) for $B_{i,t}$ and $M_{i,t}$.[14]

We estimate regressions (1) and (2), using non-overlapping five-year averages, by system GMM to tackle endogeneity problem in the inequality-development nexus (Demirgüç-Kunt and Levine, 2009; Bazillier and Hericourt, 2017). On one hand, simultaneity issues are a concern as factors affecting financial development might also be correlated with income inequality (eg changes in bank regulation). But there are reverse-causality issues too. For example, in Kumhof et al. (2015) the impact of higher inequality on bank lending may be caused by an increase in the income of the rich (by increasing loan supply), or it may descend from a drop in the income of the poor (by increasing loan demand). We choose therefore a conservative strategy and instrument economic and financial development with their initial values, legal origin, ethnic and religious fractionalization, and the absolute value of latitude.[15] These instruments were used in a number of studies, see, for instance Levine et al. (2000), Beck et al. (2003) and Clarke et al. (2006).

We use the two-step system GMM estimator rather than the difference GMM estimator because the former allows introducing more instruments by adding a second equation, thus improving estimation efficiency. While this type of estimator is designed for our dynamic setting with a short time- and large cross-sectional- dimension, it can lead to biased results in small samples, especially when the number of instruments is large (Roodman, 2009a,b). To reduce such a concern, we use across all specifications significantly fewer instruments than cross-sections. To avoid that the standard errors are downward biased we use the Windmeijer (2005) finite-sample correction to reduce the possibility of spurious precision (Roodman, 2009a,b).

Besides our measures of economic and financial development, we include the logarithm of industrial value added to GDP, average years of primary and secondary schooling, and inflation (Clarke et al., 2006; Beck et al., 2007).[16] Finally, country-fixed effects are included to control for discrepancies in the calculation of the Gini coefficient and other unobserved time-invariant differences across countries. A statistical summary of all the regressors is reported in Table 1.[17]

In the hypothesis that more finance continues to reduce inequality in a linear way, ϑ, β and γ should be negative and significant, with insignificant ϑ^*, β^* and γ^*. Along the inverted U-shaped hypothesis (Greenwood and Jovanovic, 1990), ϑ, β and γ (ϑ^*, β^* and γ^*) should be positive (negative) and significant. Instead, for the U-shaped hypothesis,ϑ, β and γ (ϑ^*, β^* and γ^*) should be negative (positive) and significant. As for the coefficients on *GDP per capita* and its squared term, the Kuznets curve predicts that α (α^*) should be positive (negative) and significant.

The results in the first columns of Tables 2 and 3 consider a simplified version of, respectively, equations (1) and (2), where the quadratic terms are excluded ($\alpha^* = \beta^* = \gamma^* = \vartheta^* = 0$). All the coefficients associated with the variable of interest are not significant indicating that a linear set up does not produce an adequate fit of the models.

The results of the complete non-monotonic specification in the second columns of Tables 2 and 3 produce more significant results.[18] In particular, the relationship between economic development and inequality has the predicted reverse U-shaped Kuznets curve (see also panel (a) in Graph 6). Regarding the FD index, as in equation (1), we show that Financial Depth and the Overall FD index are estimated to have a non-monotonic effect on inequality (columns (II) and (III)). This is consistent with a beneficial-to-detrimental pattern: up to a threshold, more finance is associated with less inequality, while the reverse happens beyond the threshold.[19] Based on the overall index in column (II) of Table 2, the threshold above which inequality

[13] We use the stock market capitalization-to-GDP ratio as a measure for market-based financial development rather than the turnover ratio, because in several financially developed countries, e.g. Hong Kong, the turnover ratio is low due to the fact that a large proportion of listed companies is either held by families or strategic investors even though financial markets are highly developed.

[14] We also tried to insert cubic terms in both equations but these turned out to be never significant. The non-significance could be related to the short time dimension of our sample of 5-year averages and the high collinearity of squared and cubic terms of development (the correlation coefficient between the two is above 0.97 for all of our development measures).

[15] Common law countries offer higher creditor and shareholder protection and thus tend to support more financial development (see discussion above). Ethnic and religious heterogeneity may have an effect on the quality of institutions, economic growth, and corruption (La Porta et al, 1999; Alesina et al, 2003; Dincer, 2008). The absolute value of latitude identifies tropical environments which tend to have lower initial endowment, economic development and quality of institutions (Easterly and Levine, 2003). This conservative strategy has a caveat in terms of weakening the tests on the validity of instruments.

[16] Average years of schooling are included as a proxy for the stock of human capital, inflation for macroeconomic instability, and industrial value added for the sectoral structure of an economy.

[17] GDP per capita, bank credit to the private sector, market capitalization for listed companies, and inflation are taken from the World Development Indicators, average years of schooling from the Barro-Lee Educational Attainment Dataset, ethnic fractionalization and religious composition from Alesina et al. (2003), average latitude from the CIA World Factbook, and legal origin from the CEPII gravity database.

[18] The p-value of the Hansen test for the FD index in column (II) of Table 2 is weakly significant (p-value of 0.07) which means that we cannot confirm the validity of the instruments. To the extent that we only use the initial values of the FD index as instruments (in addition to legal origin, ethnic fractionalization and the absolute value of latitude), this result could be related to the poor coverage of the FD index at the beginning of our sample, particularly regarding the treatment of missing values when constructing the index (e.g. the financial access index only started to be collected in 2004, see Table 3 in Svirydzenka (2016)).

[19] This result is consistent with Hasan et al (2020) who find that countries with more finance (i.e. large financial markets and institutions) and financial market depth exhibit greater wealth inequality.

Table 1
Summary statistics of the variables used in the regressions.

		Obs.	Mean	Std. dev.	Min.	Max.
Gini coefficient	Ln(Gini coefficient)	341	3.64	0.23	3.01	4.19
Top 10 income share	Ln(Top10)	237	3.40	0.23	2.99	4.05
Fifth quintile	Ln(Q5)	222	3.81	0.17	3.51	4.30
FD index	Ln(1 + FD)	338	0.33	0.17	0.06	0.69
FD index - Depth	Ln(1 + FDD)	338	0.29	0.19	0.02	0.68
FD index – Access	Ln(1 + FDA)	338	0.32	0.19	0.01	0.69
FD index - Efficiency	Ln(1 + FDE)	338	0.43	0.11	0.14	0.64
Income per capita	Ln(GDP per capita)	341	8.62	1.49	5.37	11.31
Bank credit	Ln(Bank credit to private sector/GDP)	341	3.76	0.83	1.52	5.46
Market capitalization	Ln(Market capitalization/GDP)	341	3.15	1.37	−2.49	6.11
Industrial production	Ln(Industrial production/GDP)	341	3.37	0.27	1.96	4.06
Av. years of schooling	Ln(Average years of schooling)	341	2.04	0.38	0.79	2.56
Inflation rate	Ln(100 + CPI inflation)	341	4.68	0.10	4.58	5.33

Sources: UNO-Wider WIID3.3, Standardized Income Inequality Database, Svirydzenka (2016), World Development Indicators, Barro-Lee Educational Attainment Dataset, Alesina et al. (2003), CIA World Factbook, CEPII gravity database.

Table 2
Income inequality and financial development.

Regressors	Linear model Aggregate FD index (I)	Non-linear model Aggregate FD index (II)	Non-linear model Aggregate FD index (II+)	Depth index (III)	Access Index (IV)	Efficiency index (V)	Access index (VI)
Lagged dependent variable	0.874***	0.704***		0.812***	0.883***	0.870***	0.885***
	(0.045)	(0.097)		(0.094)	(0.068)	(0.049)	(0.042)
Income per capita	0.007	**0.552***	0.229	**0.408***	0.004	−0.043	**0.016***
	(0.010)	**(0.286)**	(0.278)	**(0.223)**	(0.303)	(0.093)	**(0.009)**
Income per capita squared		**−0.033***	−0.008	**−0.024***	0.001	0.003	
		(0.017)	(0.016)	**(0.014)**	(0.018)	(0.006)	
FD index	−0.054	**−1.731****	**−1.245*****	**−1.142****	−0.003	−0.986	**−0.135****
	(0.065)	**(0.746)**	**(0.415)**	**(0.506)**	(0.721)	(1.974)	**(0.060)**
FD index squared		**2.608****	**1.422*****	**1.736****	−0.184	1.053	
		(1.153)	**(0.476)**	**(0.680)**	(1.019)	(2.370)	
Industrial production	−0.017	−0.042	−0.127**	−0.043	−0.025	−0.004	−0.023
	(0.022)	(0.030)	(0.064)	(0.037)	(0.023)	(0.027)	(0.020)
Average years of schooling	−0.022	−0.057*	−0.052	−0.064**	−0.021	−0.020	−0.018
	(0.020)	(0.030)	(0.049)	(0.027)	(0.020)	(0.021)	(0.019)
Inflation rate	0.201*	0.104	−0.036	0.064	0.216	0.172	0.197*
	(0.116)	(0.097)	(0.076)	(0.125)	(0.133)	(0.131)	(0.101)
Observations	338	338	338	338	338	338	338
Number of countries	96	96		96	96	96	96
Serial correlation test, AR(2)[1]	0.060	0.397		0.596	0.066	0.053	0.062
Hansen test[2]	0.011	0.072		0.072	0.007	0.006	0.027
No. of instruments[3]	16	16		16	16	16	16

The estimations use five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The FD index is compiled by Svirydzenka (2016). Columns (I) and (II) report the results for the aggregate index. Column (II +) is estimated by the fixed effects estimator. Columns (III) to (V) show the effects of development of financial institutions and markets along three dimensions: depth, access, and efficiency (weighted average across financial institutions and markets). Column (VI) shows a linear model for the access index. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at the 10 %, 5 % and 1 % level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

increases is 0.39 measured in levels (as can be seen in Graph 1, the advanced economies are on average above this threshold).[20] The other indicators for Access to Finance and Efficiency of Finance turn out insignificant (Table 2, columns (IV) and (V)).[21] Finally, in the more parsimonious specification shown with only a linear term (column VI of Table 2), the Access index turns out to be negative and significant. This seems to suggest that when it promotes financial inclusion, financial development has a monotonic negative relationship with income inequality.[22] This result is consistent with Hasan et al (2020) who find that

[20] The threshold for the level of the index is transformed according to $\exp\left(-\frac{\theta}{2\theta^*}\right)-1$, since the dependent variable enters in logarithm and the FD index in the logarithm of one plus the FD index.
[21] This result may be due to the higher degree of extrapolations in the construction of these indices with respect to the general one (Svirydzenka, 2016).
[22] In their study covering 151 countries, Park and Mercado (2018) find that increasing values of the index of financial inclusion are associated with lower poverty for high- and middle-high-income countries. However, the index of financial inclusion is not significantly related to income inequality across the entire sample.

Table 3
Income inequality, financial structure and legal system.

Regressors	Linear model (I)	Non-linear model (II)	Common law countries (III)	Civil law countries (IV)	Test of difference between (III) and (IV)
Lagged dependent variable	0.442***	0.711***	0.764***	0.728***	0.036
	(0.117)	(0.061)	(0.139)	(0.094)	(0.132)
Income per capita	**−0.031***	**0.508*****	−0.129	**0.673***	−0.802
	(0.018)	**(0.184)**	(0.238)	**(0.404)**	(0.571)
Income per capita squared		**−0.030*****	0.008	**−0.039***	0.047
		(0.011)	(0.014)	**(0.023)**	(0.033)
Bank credit	−0.020	**−0.509****	0.412	**−0.403***	**0.815****
	(0.016)	**(0.258)**	(0.286)	**(0.247)**	**(0.349)**
Bank credit squared		**0.068***	−0.062	0.053	**−0.115****
		(0.037)	(0.040)	(0.034)	**(0.049)**
Market capitalization	0.017	**−0.087***	**−0.140***	**−0.099****	−0.041
	(0.012)	**(0.045)**	**(0.080)**	**(0.045)**	(0.063)
Market capitalization squared		**0.019****	**0.023****	**0.020****	0.003
		(0.009)	**(0.012)**	**(0.009)**	(0.013)
Industrial production	−0.021	−0.043	0.019	−0.068	0.087
	(0.039)	(0.043)	(0.069)	(0.056)	(0.079)
Average years of schooling	−0.047	−0.097***	0.038	−0.124***	0.162***
	(0.032)	(0.025)	(0.057)	(0.037)	(0.053)
Inflation rate	0.083	−0.111	−0.020	−0.070	0.050
	(0.085)	(0.106)	(0.305)	(0.143)	(0.203)
Observations	341	341	112	229	
Number of countries	97	97	34	63	
Serial correlation test, AR(2)[1]	0.583	0.507	0.681	0.138	
Hansen test[2]	0.558	0.992	0.334	0.269	
No. of instruments[3]	13	17	16	17	

The estimations are done for five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The variable "bank credit" is the logarithm of the ratio bank credit over GDP. "Market capitalization" is the logarithm of the ratio stock market capitalization over GDP. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.

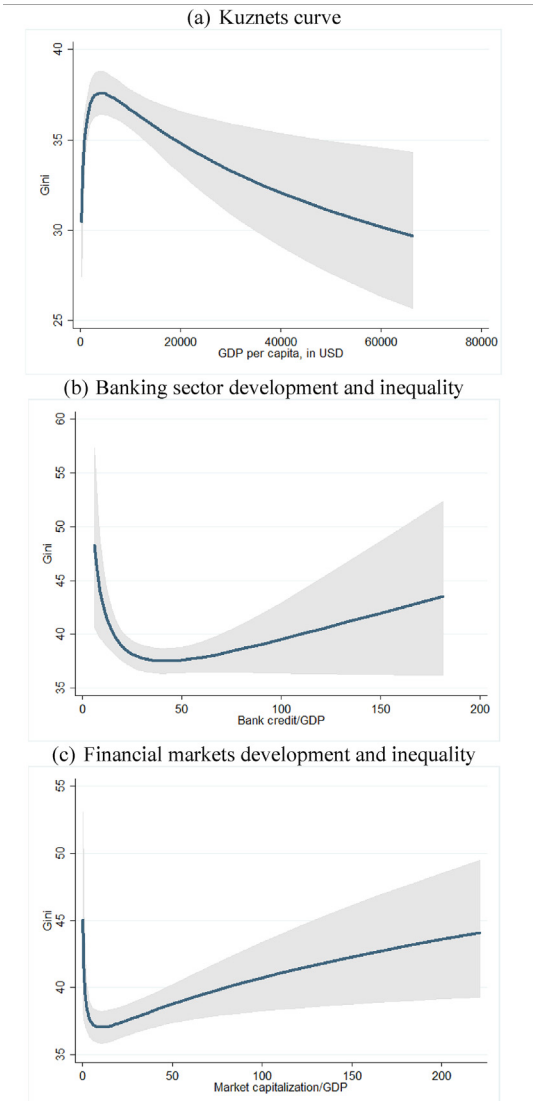
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

countries with greater access to finance are associated with less wealth inequality. The result is also in line with Claessens and Perotti (2007) who argue that inequality is mainly reduced by improved access to financial resources rather than by a simple increase in the depth of finance, which tends to benefit the richer parts of society.

From Table 3 we can see that both higher bank and higher market activity also relate to lower inequality but only up to a threshold. Both indicators are statistically significant, suggesting that banks and financial markets provide different and complementary services (Allen and Gale, 2000). The limits of financial deepening on inequality are also depicted in Graph 6. The horizontal axis indicates both credit-to-GDP (panel (b)) and market capitalization-to-GDP (panel (c)), while the vertical axis measures income inequality. Income inequality drops as the ratio of bank credit to GDP rises until the level of 41 %. The corresponding minimum for market capitalization is 10 %. Based on these thresholds, 48 of the 97 countries exceed the threshold for bank credit and 74 are above the threshold for market financing (43 countries exceed both thresholds).[23] These results concur with Delis et al. (2014) showing that securities market liberalization greatly increases income inequality. It is worth noting that, on the contrary, a higher level of banking activity is not significantly associated with an increase of income inequality.

Splitting the sample into common and civil law countries, the non-linear effect of market-based financial development emerges in both groupings and is not too dissimilar. In common law countries, the threshold above which inequality starts increasing is somewhat higher (19 % vis-à-vis 12 % in civil law countries). Moreover, we find a nearly significant U-shaped relationship between bank-based financial development and inequality in civil law countries (the p-value of the quadratic term is 0.12). In common law countries, on the contrary, banks seem to provide their traditional services in a way that does not influence the distribution of incomes. Finally, another interesting finding is that the Kuznets relationship between economic development and inequality is only significant in civil law countries. It thus appears that market-based financial development has been the main driver of inequality in the advanced financial systems of the common law countries, whereas all three types of economic and financial development have affected inequality in the civil law countries.

[23] The results are qualitatively very similar in a simpler model that omits the lagged dependent variable.



Graph 6. Link between income inequality, economic and financial development. Note: The non-linear effect is calculated from the regression in column (II) of Table 3. The marginal effects are calculated at average values of the regression variables. The shaded area shows 95% confidence bands.

6. Robustness checks and transmission channels

6.1. Robustness checks

The robustness of the above results has been checked in several ways.

First, we checked whether the relationship between financial development and inequality is confirmed by considering the top 10 per cent income share instead of the Gini coefficient. The results do confirm our previous findings. Namely, the linear term shows a negative effect while the quadratic term exhibits a positive sign, so that the latter effect will overturn the former one beyond a certain threshold (Table 4). This turns out to be the case for the Financial Depth and the Overall FD index as in the case of Table 2 confirming the "beneficial-to-detrimental" pattern also with respect to the top of the income distribution (columns (I) and (II)). Results are qualitatively similar with respect to the baseline regressions when we disentangle the effects of the bank indicator from those of the market indicator. In the final column of Table 4 we replace the top 10 income share as dependent variable with the fifth (bottom) quintile of the income distribution. Our FD indicator is insignificant here. Putting together the results of columns (I) and (V) of Table 4 suggest that indeed, as proposed by Stiglitz (2015), the relationship between financial development and inequality is driven by the top income share rather than the bottom of the income distribution.

Table 4
Using top 10 percent of income distribution.

Regressors	Non-linear model Aggregate FD index (I)	Depth index (II)	Access index (III)	Efficiency index (IV)	Non-linear model Aggregate FD index (V)
Lagged dependent variable	0.655***	0.708***	0.859***	0.844***	0.824***
	(0.117)	(0.110)	(0.058)	(0.066)	(0.122)
Income per capita	**0.978***	**1.273****	0.463	−0.067	0.177
	(0.518)	**(0.563)**	(0.315)	(0.167)	(0.314)
Income per capita squared	**−0.058***	**−0.075****	−0.026	0.005	−0.011
	(0.032)	**(0.034)**	(0.017)	(0.010)	(0.019)
FD index	**−3.045*****	**−2.371*****	−1.085	1.571	−0.420
	(1.133)	**(0.844)**	(0.912)	(1.724)	(0.988)
FD index squared	**4.541****	**3.996*****	1.349	−2.251	0.625
	(1.910)	**(1.545)**	(1.174)	(2.146)	(1.497)
Industrial production	−0.015	−0.073	−0.026	0.022	−0.018
	(0.060)	(0.076)	(0.041)	(0.042)	(0.032)
Average years of schooling	−0.150**	−0.187***	−0.035	−0.064*	−0.027
	(0.065)	(0.057)	(0.035)	(0.035)	(0.033)
Inflation rate	−0.111	−0.080	0.132	0.207	0.115
	(0.166)	(0.139)	(0.174)	(0.129)	(0.148)
Observations	237	237	237	237	222
Number of countries	80	80	80	80	78
Serial correlation test, AR(2)[1]	0.442	0.592	0.103	0.612	0.973
Hansen test[2]	0.101	0.194	0.006	0.034	0.015
No. of instruments[3]	19	19	19	19	16

The estimations use five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Top 10 per cent of income distribution taken from the World Bank. The FD index is compiled by Svirydzenka (2016). Column (I) reports the result for the aggregate financial development index. Columns (II) to (IV) report the effects of development of financial institutions and markets along three dimensions: depth, access, and efficiency (weighted average across financial institutions and markets). In column (V) the dependent variable is replaced by the fifth quintile (Q5) of the income distribution. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.

[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

Second, similar to splitting the sample across common and civil law systems in Table 3, we divided it into countries with a high-to-medium degree of economic freedom versus those that have a low score.[24] To some extent high economic freedom is determined by the law system, however, having a common law system in place does not imply that economic freedom is high as well (out of the 34 common law countries, 10 (24) are classified as having low (high) economic freedom). The results reported in Table 5 indicate that, while for low economic freedom countries there is a positive and significant correlation between inequality and high values of both financial development indicators – for higher freedom countries this correlation is significant only with respect to the financial market development indicator.

Third, we checked if the results differ for the countries more active in using macroprudential policies, chiefly aimed to curb systemic risk and the probability of a financial crisis. So, we split the sample in two, along an index of macroprudential activism computed using the indicator by Altunbaş et al. (2018) and counting the number of changes in macroprudential tools by country in the observation period. In line with Frost and van Stralen (2018), the results show that the link between financial structure and inequality is present in both country groups, but is stronger for market-based financial development in countries which made more use of macroprudential policies (Table 6). The Kuznets curve is more pronounced for countries that have actively used macroprudential policies.

Fourth, we investigated whether the link between financial development and inequality depends on the transparency of bank financial statements to the extent that banks appear to charge higher interest margins in more opaque banking systems (Birchwood et al., 2017). By increasing information asymmetries between bank insiders and outsiders, low financial transparency can have a negative effect on private sector monitoring of banks and therewith on their pricing and wage policies. As before, we thus split the sample into those countries with low and high informational barriers based on the database complied by Barth et al. (2013).[25] The results reported in Table 7 suggest that bank-based financial development is not significantly

[24] The index, compiled by the Heritage Foundation since 1995, is an average score that assesses the quality of rule of law, regulatory efficiency, open markets and the extent to which governments intervene in the economy. High to medium economic freedom countries are those for which the country-specific mean of the score is above the 25th percentile of the distribution, whereas those with a low score are those countries that rank below the 25th percentile.

[25] Reporting transparency is an index on a scale from 0 to 6 (higher value indicates higher financial statement transparency of banks). Countries with high transparency have an average index (over 1999–2013) above the median and countries with low transparency have an average index equal to or below the median.

Table 5
Income inequality, financial structure and economic freedom.

Regressors	Linear model (I)	Non-linear model (II)	High/medium economic freedom countries (III)	Low economic freedom countries (IV)	Test of difference between (III) and (IV)
Lagged dependent variable	0.442***	0.711***	0.789***	0.633***	0.156
	(0.117)	(0.061)	(0.066)	(0.156)	(0.220)
Income per capita	−0.031*	**0.508***	−0.021	**1.584*****	**−1.605****
	(0.018)	**(0.184)**	(0.434)	**(0.522)**	**(0.738)**
Income per capita squared		**−0.030*****	0.001	**−0.103*****	**0.103****
		(0.011)	(0.025)	**(0.034)**	**(0.048)**
Bank credit	−0.020	**−0.509****	0.065	**−0.557*****	**0.622****
	(0.016)	**(0.258)**	(0.384)	**(0.206)**	**(0.291)**
Bank credit squared		**0.068***	−0.012	**0.070****	**−0.082***
		(0.037)	(0.053)	**(0.031)**	**(0.044)**
Market capitalization	0.017	**−0.087***	**−0.101****	**−0.201*****	0.100
	(0.012)	**(0.045)**	**(0.040)**	**(0.064)**	(0.091)
Market capitalization squared		**0.019****	**0.020*****	**0.043*****	−0.023
		(0.008)	**(0.007)**	**(0.012)**	(0.017)
Industrial production	−0.021	−0.043	−0.018	−0.153*	0.135
	(0.039)	(0.043)	(0.037)	(0.089)	(0.125)
Average years of schooling	−0.047	−0.097***	−0.059**	−0.142***	0.082
	(0.032)	(0.025)	(0.027)	(0.050)	(0.070)
Inflation rate	0.083	−0.111	−0.115	−0.256	0.141
	(0.085)	(0.106)	(0.125)	(0.434)	(0.613)
Observations	341	341	262	79	
Number of countries	97	97	73	24	
Serial correlation test, AR(2)[1]	0.583	0.507	0.244	0.713	
Hansen test[2]	0.558	0.992	0.329	0.232	
No. of instruments[3]	13	17	17	17	

The estimations are done for five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The variable "bank credit" is the logarithm of the ratio bank credit over GDP. "Market capitalization" is the logarithm of the ratio stock market capitalization over GDP. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

related to inequality in countries where financial statement transparency of banks is high, whereas it is nearly significant in the other countries (the p-values of the linear and quadratic terms are below 0.15). The finding seems to suggest the existence of a positive market discipline impact through improvements in effective private monitoring of banks associated with higher transparency.

Last, we performed a placebo test by regressing our three development indicators (GDP, banks and markets) on past levels of inequality to address the concern of unobserved long-run common causal factors. As can be seen in Table 8, the coefficients on the first and second lag of the Gini coefficient are insignificant which confirms our main results on the causal link going from financial development to income inequality.

6.2. Transmission channels

This subsection sheds more light on the finance-inequality relationship by investigating the role of financial crises, financial openness and financial inclusion. We thus first re-estimate our baseline model (1) and interact our measures for economic and financial development with (i) a financial crisis indicator and (ii) an indicator for financially-open economies. In the next step, we focus on our financial access indicator and test whether its impact depends on the economic, legal and institutional environment.

Table 6
Income inequality, financial structure and macroprudential policy.

Regressors	Linear model (I)	Non-linear model (II)	High macroprud. policy (III)	Low macroprud. policy (IV)	Test of difference between (III) and (IV)
Lagged dependent variable	0.442***	0.711***	0.594***	0.768***	−0.174
	(0.117)	(0.061)	(0.110)	(0.086)	(0.122)
Income per capita	−0.031*	**0.508***	**1.084****	**0.388****	**0.697****
	(0.018)	**(0.184)**	**(0.494)**	**(0.149)**	**(0.211)**
Income per capita squared		**−0.030*****	**−0.064****	**−0.023****	**−0.040*****
		(0.011)	**(0.029)**	**(0.009)**	**(0.013)**
Bank credit	−0.020	**−0.509****	**−0.529****	**−0.467***	−0.063
	(0.016)	**(0.258)**	**(0.211)**	**(0.267)**	(0.377)
Bank credit squared		**0.068***	**0.072****	**0.062***	0.010
		(0.037)	**(0.031)**	**(0.037)**	(0.053)
Market capitalization	0.017	**−0.087***	**−0.083****	−0.014	−0.070
	(0.012)	**(0.045)**	**(0.039)**	(0.077)	(0.109)
Market capitalization squared		**0.019****	**0.017*****	0.005	0.012
		(0.009)	**(0.007)**	(0.014)	(0.020)
Industrial production	−0.021	−0.043	−0.034	−0.045	0.011
	(0.039)	(0.043)	(0.077)	(0.030)	(0.042)
Average years of schooling	−0.047	−0.097***	−0.224***	−0.059**	−0.165***
	(0.032)	(0.025)	(0.081)	(0.030)	(0.042)
Inflation rate	0.083	−0.111	−0.202	−0.094	−0.109
	(0.085)	(0.106)	(0.176)	(0.169)	(0.239)
Observations	341	341	111	230	
Number of countries	97	97	29	68	
Serial correlation test, AR(2)[1]	0.583	0.507	0.231	0.061	
Hansen test[2]	0.558	0.992	0.581	0.699	
No. of instruments[3]	13	17	17	17	

The estimations are done for five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The variable "bank credit" is the logarithm of the ratio bank credit over GDP. "Market capitalization" is the logarithm of the ratio stock market capitalization over GDP. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.

[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

The results on the financial crisis and FDI interactions are shown in Tables 9 and 10, respectively. We observe that the non-linear relationship between income inequality and financial development is not significantly altered during a crisis period. This is evident in the first two columns of Table 9 for both crises that occurred over the entire sample period (column I) and only for those that occurred prior to the GFC (column II). Indeed, it appears that the U-shaped form becomes more acute but in a way that is not statistically significant. The only difference is when we measure financial development in terms of efficiency, see column (V). In this case, the relationship between financial development and inequality seems to be driven by crisis periods whereas during normal times the link is insignificant. In other words, inequality tends to increase by less when FD is larger, but only when FD is measured with the efficiency measure. Concerning financial openness, we observe that the U-shaped relationship between financial development and income inequality is driven by countries with higher levels of FDI that benefit more from global investments, see column (I) of Table 10. Financial openness allows countries to access foreign capital markets and therewith to better share risks. This might reinforce the initial decrease in inequality when financial development takes place. Above a certain limit, however, inequality increases again which could be linked to higher rent extraction of established and large foreign investors or to increases in the skill premium, i.e. higher wage differentials across skilled and unskilled workers. This result is in line with the findings of Dabla-Norris et al. (2015) and Hasan et al. (2020) who find that increased exposure to outside markets is associated with higher levels of income and wealth inequality, respectively.

Lastly, we report the results on financial access in Table 11. More specifically, we have re-estimated our linear model shown in column (VI) of Table 2 adding interaction terms of the financial access indicator with dummies for the presence of a financial crisis, or for countries characterised by high income, British legal origin, high economic freedom and high financial transparency. As can be seen, the inequality-reducing impact of the development of financial access remains significant in all specifications, but the impact is reinforced during banking and financial crises (column II) and in countries where financial transparency is high. This points to the importance of financial access development in protecting low income individuals during crises and to the positive role played by lower levels of information asymmetries.

Table 7
Income inequality, financial structure and bank transparency.

Regressors	Linear model (I)	Non-linear model (II)	High bank transparency (III)	Low bank transparency (IV)	Test of difference between (III) and (IV)
Lagged dependent variable	0.442***	0.711***	0.846***	0.641***	0.205*
	(0.117)	(0.0607)	(0.108)	(0.088)	(0.124)
Income per capita	−0.031*	**0.508***	0.003	**0.732****	−0.729
	(0.018)	**(0.184)**	(0.206)	**(0.316)**	(0.447)
Income per capita squared		**−0.030*****	−0.000	**−0.044****	0.044
		(0.0112)	(0.012)	**(0.019)**	(0.027)
Bank credit	−0.020	**−0.509****	0.041	−0.508	0.550
	(0.016)	**(0.258)**	(0.191)	(0.330)	(0.466)
Bank credit squared		**0.068***	−0.007	0.068	−0.075
		(0.037)	(0.028)	(0.047)	(0.067)
Market capitalization	0.017	**−0.087***	**−0.081****	**−0.145***	0.064
	(0.012)	**(0.045)**	**(0.041)**	**(0.083)**	(0.117)
Market capitalization squared		**0.019****	0.016	**0.033***	−0.017
		(0.009)	(0.010)	**(0.019)**	(0.027)
Industrial production	−0.021	−0.043	−0.048	−0.112*	0.064
	(0.039)	(0.0428)	(0.049)	(0.065)	(0.092)
Average years of schooling	−0.047	−0.097***	−0.038	−0.124**	0.086
	(0.032)	(0.025)	(0.036)	(0.051)	(0.073)
Inflation rate	0.083	−0.111	0.145	−0.206	0.352
	(0.085)	(0.106)	(0.252)	(0.227)	(0.320)
Observations	341	341	142	180	
Number of countries	97	97	40	51	
Serial correlation test, AR(2)[1]	0.583	0.507	0.389	0.635	
Hansen test[2]	0.558	0.992	0.077	0.689	
No. of instruments[3]	13	17	17	17	

The estimations are done for five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The variable "bank credit" is the logarithm of the ratio bank credit over GDP. "Market capitalization" is the logarithm of the ratio stock market capitalization over GDP. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

Table 8
Placebo test.

Regressors	GDP per capita (I)	Bank credit (II)	Market capitalization (III)
Lagged dependent variable	0.942***	0.886***	0.762***
	(0.027)	(0.091)	(0.190)
Gini coefficient (t-1)	−0.180	−0.594	−0.015
	(0.124)	(0.392)	(1.550)
Gini coefficient (t-2)	0.071	0.283	−0.202
	(0.131)	(0.392)	(1.429)
Industrial production	0.105	−0.069	0.254
	(0.069)	(0.108)	(0.312)
Average years of schooling	0.146**	0.075	−0.055
	(0.067)	(0.096)	(0.270)
Inflation rate	−0.350	−0.513	0.260
	(0.298)	(0.779)	(1.857)
Observations	251	251	251
Number of countries	95	95	95
Serial correlation test, AR(2)[1]	.	.	.
Hansen test[2]	0.001	0.027	0.001
No. of instruments[3]	18	18	18

The estimations are done for five-year averages over the period 1989–2012. The dependent variables are the logarithm of GDP per capita, the logarithm of the ratio bank credit over GDP, and logarithm of the ratio stock market capitalization over GDP. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at 10%, 5% and 1% level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

Table 9
Income inequality, financial development and financial crises.

Regressors	Aggregate FD index (I)	Aggregate FD index (II)	Depth Index (III)	Access Index (IV)	Efficiency index (V)	Access index (VI)
Income per capita	**0.671***	**0.548***	**0.484***	0.065	0.026	0.0124
	(0.353)	**(0.341)**	**(0.261)**	(0.295)	(0.102)	(0.008)
Income per capita squared	**−0.040***	**−0.031***	**−0.028***	−0.003	−0.001	
	(0.021)	**(0.020)**	**(0.016)**	(0.017)	(0.006)	
Income per capita*crisis	**0.600***	**0.734***	**0.481****	0.030	0.317	**0.017****
	(0.325)	**(0.446)**	**(0.237)**	(0.295)	(0.208)	**(0.008)**
Income per capita squared*crisis	**−0.036***	**−0.053***	**−0.029****	−0.001	−0.018	
	(0.020)	**(0.029)**	**(0.014)**	(0.017)	(0.012)	
FD index	**−2.610***	**−2.102*****	−1.504	−0.383	2.892	**−0.107***
	(1.371)	**(0.770)**	(1.001)	(0.806)	(2.956)	**(0.061)**
FD index squared	**3.835***	**2.779****	2.209	0.401	−3.553	
	(2.069)	**(1.158)**	(1.428)	(1.120)	(3.532)	
FD index*crisis	−0.376	−3.123	−0.808	1.320	**−3.841***	**−0.235****
	(2.150)	(3.826)	(0.981)	(1.120)	**(2.280)**	**(0.094)**
FD index squared*crisis	0.894	5.771	1.485	−2.108	**4.839***	
	(3.069)	(6.139)	(1.276)	(1.476)	**(2.874)**	
Observations	338	338	338	338	338	338
Number of countries	96	96	96	96	96	96
Serial correlation test, AR(2)[1]	0.820	0.942	0.595	0.170	0.170	0.075
Hansen test[2]	0.130	0.352	0.059	0.023	0.053	0.070
No. of instruments[3]	19	19	19	19	19	19

The estimations use five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The FD index is compiled by Svirydzenka (2016). The lagged dependent variable is included along with the other control variables but not reported. The "crisis" dummy is equal to one in the five-year window in which a banking and financial crisis occurred based on Leaven and Valencia (2018). Columns (I) reports the results for the aggregate index with a crisis dummy over the entire observation period. Column (II) uses instead a crisis dummy that only takes into account crises prior to the GFC. Columns (III) to (V) show the effects along three dimensions for the crisis dummy over the entire observation period: depth, access, and efficiency (weighted average across financial institutions and markets). Column (VI) shows a linear model for the access index. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at the 10%, 5% and 1% level.
[1]Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

Table 10
Income inequality, financial development and financial openness.

Regressors	Aggregate FD index (I)	Depth Index (II)	Access Index (III)	Efficiency index (IV)	Access index (V)
Income per capita	**0.999****	0.484	−0.240	**−0.434***	**0.022****
	(0.508)	(0.464)	(0.394)	**(0.235)**	**(0.011)**
Income per capita squared	**−0.062****	−0.029	0.017	**0.027***	
	(0.031)	(0.029)	(0.024)	**(0.014)**	
Income per capita*high FDI	**1.066***	0.539	−0.146	0.031	**0.017****
	(0.560)	(0.363)	(0.341)	(0.147)	**(0.009)**
Income per capita squared*high FDI	**−0.063***	−0.030	0.009	−0.001	
	(0.033)	(0.022)	(0.020)	(0.008)	
FD index	0.089	1.340	2.474	**5.537***	**−0.192***
	(2.540)	(4.286)	(2.750)	**(3.365)**	**(0.106)**
FD index squared	0.436	−1.745	−4.199	**−6.795***	
	(3.926)	(6.728)	(4.411)	**(4.008)**	
FD index*high FDI	**−3.389***	−2.103	−0.167	−3.842	**−0.124***
	(1.923)	(1.413)	(1.004)	(3.626)	**(0.0660)**
FD index squared*high FDI	**4.946***	**3.055***	0.0812	4.421	
	(2.773)	**(1.829)**	(1.334)	(4.327)	
Observations	338	338	338	338	338
Number of countries	96	96	96	96	96
Serial correlation test, AR(2)[1]	0.783	0.655	0.110	0.879	0.063
Hansen test[2]	0.281	0.202	0.189	0.410	0.015
No. of instruments[3]	19	19	19	19	19

The estimations use five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The FD index is compiled by Svirydzenka (2016). The lagged dependent variable is included along with the other control variables but not reported. "High FDI" are countries for which foreign direct investments as a percentage of GDP are above the first quartile of the distribution. Column (I) reports the results for the aggregate index. Columns (II) to (IV) show the effects of development of financial institutions and markets along three dimensions: depth, access, and efficiency (weighted average across financial institutions and markets). Column (V) shows a linear model for the access index. All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at the 10%, 5% and 1% level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

Table 11
Income inequality and financial access development.

Regressors	Financial crises (I)	High income countries (II)	British law countries (III)	High/medium economic freedom (IV)	High financial transparency (V)
Lagged dependent variable	0.885***	0.895***	0.874***	0.891***	0.861***
	(0.040)	(0.043)	(0.043)	(0.043)	(0.047)
Income per capita	0.017**	0.012	0.014*	0.013*	0.013
	(0.008)	(0.008)	(0.008)	(0.007)	(0.009)
Financial access	**−0.124****	**−0.152****	**−0.129****	**−0.221****	**−0.152****
	(0.059)	**(0.063)**	**(0.059)**	**(0.091)**	**(0.076)**
Financial access*interaction	**−0.163****	−0.108	−0.073	−0.096	**−0.107***
	(0.065)	(0.066)	(0.061)	(0.068)	**(0.062)**
Industrial production	−0.028	−0.023	−0.028	−0.019	−0.008
	(0.020)	(0.021)	(0.020)	(0.020)	(0.022)
Average years of schooling	−0.020	−0.016	−0.026	−0.023	−0.024
	(0.019)	(0.019)	(0.020)	(0.021)	(0.020)
Inflation rate	0.208**	0.202**	0.221**	0.252**	0.224**
	(0.099)	(0.099)	(0.094)	(0.113)	(0.096)
Observations	338	338	338	338	338
Number of countries	96	96	96	96	90
Serial correlation test, AR (2)[1]	0.092	0.063	0.068	0.070	0.077
Hansen test[2]	0.050	0.030	0.038	0.048	0.126
No. of instruments[3]	17	17	17	17	17

The estimations use five-year averages over the period 1989–2012. The dependent variable is the logarithm of the Gini coefficient on net income. The financial access index is compiled by Svirydzenka (2016) and interacted with the following variables: financial crises (column I), high income countries (II), countries with the British law system (III), countries with high economic freedom (IV), and countries with high financial transparency (V). All estimations are based on the system GMM estimator. Robust standard errors are in parentheses. The constant is not reported. *, **, *** indicate significance at the 10%, 5% and 1% level.
[1] Reports p-values for the null hypothesis that the errors in the first difference regression exhibit no second order serial correlation. [2] Reports p-values for the null hypothesis that the instruments are valid. [3] Reports the number of instruments.

7. Conclusions and policy implications

This paper empirically investigates the link between financial development and income inequality accounting for financial structure (bank vs market) and allowing the finance-inequality link to be non-linear. Hence, we ask four key questions: i) does financial development affect inequality?; ii) does financial structure matter?; iii) is there a non-linear relationship (with sign change at a certain threshold)?; and iv) does this non-linear relationship differ for bank- vs market-finance?

Using data for a panel of 97 advanced and emerging market economies, we uncover some major findings. First, financial development does have a link with income inequality. Second, the link is different for bank- vs market-financing. Third, effectively, the relationship is not monotonic. Contrary to the predictions of Greenwood and Jovanovic (1990), but concurring with more recent evidence of rising income inequality in financially advanced economies (Piketty, 2014), we find evidence of a U-shaped relationship between financial development and inequality. In other words, a beneficial-to-detrimental pattern emerges: more financial development is associated with reductions in income inequality below a certain threshold. In other words, up to a point, more finance is associated with lower income inequality. Beyond that point, however, further financial development correlates with higher income inequality. Fourth, the beneficial-to-detrimental pattern applies only to market-based financial development and not significantly to bank-finance. We also provide evidence that this inequality-enhancing mechanism works through expanding the top part of the income distribution. The evidence is robust to controlling for country-specific institutional designs, alternative financial development measures, different levels of macroprudential policy activism, and financial transparency.

Our results shed new light on the finance-inequality relationship considering three key factors: Crises, FDI, and financial access. First, we find that the relationship between financial structure and income inequality shows little sensitivity to the occurrence of crises. By contrast, the finance-inequality relationship seems to be reinforced in countries which receive large flows of FDI and/or when financial deepening takes the form of improved financial access.

The literature suggested a number of policies that can help in reducing income disparities and enhance financially-inclusive development. Our results point towards at least two important dimensions. First, enhancements in financial transparency reduce information asymmetries across the financial industry and the other parts of the economy. These enhancements render financial decisions makers more accountable and income disparities more visible. Second, financial development focused on financial access and inclusion has an inequality-reducing impact. Policies should therefore encourage projects and financial innovations that foster society's access to financial services. Of course, tax policies aimed at redistribution can play a role, but taxes might distort incentives and, if adopted unilaterally, lead to capital outflows and therewith to economic downturns.

CRediT authorship contribution statement

Michael Brei: Conceptualization, Methodology, Software, Writing – review & editing. **Giovanni Ferri:** Conceptualization, Methodology, Writing – review & editing. **Leonardo Gambacorta:** Conceptualization, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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