

Income Inequality and Financial Development: a Multidimensional Approach

Carola Casti (The University of Cagliari, Italy)

Paper prepared for the 35th IARIW General Conference

Copenhagen, Denmark, August 20-25, 2018

Session 7E-1, Short Paper Session: Financial Accounts

Time: Friday, August 24, 2018 [14:00-17:30]

Income inequality and financial development: a multidimensional approach. Evidence from panel data.

Carola Casti† University of Cagliari.

October, 2017

Abstract

This work investigates the link between income inequality and financial development, by studying a heterogenous sample of countries between 1960 and 2014. Three main dimensions are tested: the structure (banking versus stock market systems), the *depth* (amount of aggregate credit lent to private sector and also disaggregated between households and firms) and the *efficiency* (lending-deposit spread). Besides this, we test two main interactions to analyze whether the level of economic development and the real structure of the economy may interfere with the way in which financial development affects the level of inequality. Both the static fixed effect and the dynamic GMM estimator apply respectively to annual and five year averaged data. Results of this work suggests that i) banking indicators tend to be associated with higher level of inequality, while stock market systems are found to enhance a more egalitarian income distribution; ii) a U-shaped pattern is depicted in data when the depth dimension is tested, suggesting that 'too much credit' is pro-inequality; iii) a non-linearity is overall confirmed also when data on aggregate private credit are disentangled according by the type of borrower. However, while a U-shape relationship is found between inequality and the household private credit, an *inverse U-shape* is depicted, in most cases, between income inequality and the private credit lent to firms. Furthermore, iv) higher levels of spread are found to be positively linked to inequality. With respect to the interactions tested in the model, v) as an economy develops, finance tends to exacerbate the level of inequality; iv) the real structure and the financial structure appear to exert a joint effect on income inequality.

Keywords— Income inequality, economic development, financial development, financial intermediation, banking, financial structure, firm credit, household credit

JEL: E44, G20, O11, O15, O40.

1 Introduction

Lately, after the financial recession, the public has started paying considerable attention on the increasing level of inequality worldwide.¹ Indeed, the OECD report from November 2016 highlighted the dramatic level of income inequality.² Several factors might have contributed to exacerbate this phenomenon: reduced role of labour union (Diamond, 2016); globalisation and technology (Jaumotte et al, 2013); structural change (Kum, 2008); executives' bonus and compensation (Bakija et al., 2012; Kaplan and Rauh, 2010); skill biased technological change; tax and transfer system (Denk, Cazenave-Lacroutz, 2015). However, this study focuses on the importance of another possible determinant of inequality. May, indeed, financial development play a role in explaining this worrying trend? An interesting key fact, depicted by Piketty and Saez's (2014), is the pattern of inequality (measured by authors using the top 1% income earners) over time. It reached high levels before the Great Depression (due to capital income), followed by lower and steadier levels between the World War II and the 70's. From the mid 70's it has shown an increasing trend (due to labour income), overall displaying a U-shaped trend over time. Most interestingly, also financial sector has dramatically started developing since the beginning of the 70's. Despite the importance of the relationship and the policy implications which could follow, few works have been developed so far and the results are inconclusive since their predictions are sometimes antithetical. There is then a need to address this link and shed further light on this relationship. Economic theory suggests that, in presence of an efficient financial system, the allocation of capital would be optimal and also its use would be productive. On the contrary, if financial development is more associated with risk misallocation and speculation, then, it could have negative effects in terms of redistribution (Diamond, 2016). To have a better idea of the size of financial system, it is interesting to show the pattern of the credit lent to the private sector over time. Figure 1 highlights the increasing share of credit lent to private sector as percentage of GDP. This is the average pattern which pools developed and developing

¹Fernández, A. and Tamayo, C. E. (2017) define financial development as the 'process by which finanical system ameliorate (or eventually overcome) infomation and enforcement fricitons, as well transaction costs, in order to facilitate trade, mobilize savings and diversify risk.

According to Epstein (2005) the term 'financialization' refers to "the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies".

² "Income inequality remains at record-high levels in many countries despite declining unempoloyment and improving employment rates". (OECD report, Nov.2016)



Figure 1: Pattern of the variable 'privy'over time, as proxy of financial deepening. Source: author's calculation based on GFDD dataset.

economies together (despite the different level of financial intermediation between these two types of economies, the upward trend over time is common to both). Most notably, this graph points out the dynamism of financial development, along its 'size' dimension. Finance in its broader meaning (including financial reforms, economic development and financial innovation) is not an immutable and time invariant phenomenon. Therefore it is reasonable to wonder if and to what extent it has affected the pattern of inequality across and within countries. The importance of financial system and its development in terms of income redistribution stems from the main functions it exerts: it should allocate more efficiently private savings, better manage the risk through 'pooling' and reduce the information asymmetries in the credit market by screening and monitoring. This means that no credit misallocation should arise in presence of well functioning financial systems. This would ensure all individuals to have more equal opportunities, which might also translate into lower level of income inequality. An increasing number of works dealing with this topic has been recently developed and different positions have been taken, though, no consensus has been reached. Indeed, financial development could affect negatively inequality ('narrowing hypothesis'), by allocating efficiently resources and allowing all the agents to join the credit markets (Beck et al., 2007). Nonetheless, inequality could be widen, since initial differences in endowments among agents can perpetuate inequality in the long run (Benarjee and Newman, 1993). Along these extreme theories, there are some works that do not consider financial development beneficial or harmful in toto for income inequality. They support the hypothesis that financial development might exert a double effect on income inequality, resulting in a non-linear

relationship, either U-shape (Tan and Law, 2014) or inverse U-shape (Greenwood and Jovanovic, 1990). No consensus among scholars seems to exist, which suggests that this link deserves further attention to be explained. Indeed, assessing this relationship may pheraps shed light on the mechanisms that still prevents income distribution from being egalitarian. Understanding whether and how financial development is associated with inequality may also contribute to limit the political instability, often arising as social reaction against unequal income distribution in a society. By using the words of Beck, Kunt and Levine(2007) "[...] reductions in income inequality might lead to political pressures to create more efficient financial systems that fund projects based on market criteria, not political connections" (pag.34). Hence, to get some insights from this link can be valuable and useful.

Provided that financial development includes several dimensions, this work aims at investigating how each of them (when data are available) is associated to the level of income inequality (measured by three complementary indicators, *EHII* index, *net* and *gross Gini*). More specifically, this study analyses - as main dimensions- the *financial structure*, the *depth* and the *efficiency*.

Firstly, it is tested whether and how the banking system differs from the stock market system in the way they affect inequality. In spite of the similar functions performed by them, mainly in channelling savings and investments (Dow and Gorton, 1997), some remarkable differences exist. They might differ in their way to process information, as stock markets embrance new technologies easily, while banks are more conservative and less dynamic (Allen and Gale, 1999). Beside this, in the saving-investment process, while in capital markets agents -with resources- will buy directly the stocks issued by the firms operating in the market; in the banking system this process rely on banks acting as intermediates between the lenders and the borrowers.

The second dimension that is analysed is the 'intensive margin' of financial development, or 'depth', which is the proxy for the size of financial intermediation. It represents the share of total amount of credit that banks and non-banks financial institutions lend to private sector (as percentage of GDP). Of this dimension, by following the theoretical literature, the non-linearity is tested, to analyze whether an excessive level of private credit may results in a higher or lower degree of inequality. Stiglitz (2015, February 18) explains the crucial link between credit and inequality as potentially harmful, since recently "lending has not gone for creating new business, not for capital goods. Disproportionately it has gone to increase the value of land and other fixed resources. [...] And so those who hold wealth become wealthier. The workers, who have no wealth, do not *benefit from that (credit) expansion.*^{"3} Hence, credit channel might play a crucial role in explaining the recent trend in inequality. Accordingly, to better study this mechanism, an additional and original contribution of this study involves disentangling the effect of private credit on income inequality according to the type of borrower, both house-holds and firms. We do this by exploiting the availability of data from BIS (Bank of International Settlements) database for a subsample of countries.

The last dimension -being the object of this study- is the *efficiency*, measured as the spread between the lending and the deposit rate. It is a proxy both for the degree of imperfections in the market and the level of monopolistic power in the banking system (Acemoglu, 2008). The width of this spread points out the expected inefficiency in the banking system. The wider the spread, the more inefficient the banking system of an economy is expected to be.

Two other contributions of this work focus on two main interactions: the first one, following Roine and Vlachos (2009) tests whether, for different levels of economic development, the effect of financial development on inequality changes. As far the second one, given the real structure of the economy and the structural transformation, which has taken place over the past decades worldwide, we test whether and to what extent real and financial structures interact to each other and how they affect the level of inequality. As far as we know, this is the first paper exploring this specific interaction. Indeed, there is evidence that capital intensive based economies (industry based) are more bank oriented and dependent on external finance; whilst the more human capital/knowledge intensive firms (more relying on the service sector) are more stock market oriented (Allen, Bartiloro and Kowaleski, 2005). Hence, we analyse if bank based industry oriented economies differ from those which are stock market based and more intensive in the service sector (which comprehends the financial sub-sector). Not surpisingly, Anglo-Saxon economies (such as the US and UK as main examples) not only heavily rely on the service sector and stock-markets, but they are also sadly well-known to have experienced in the last 30 years a dramatic increase in inequality (especially at the very top of the income distribution). On the other hands, countries like Germany or the Scandinavian economies are characterised by efficient bank systems, large industrial production and low level of inequality (given also the central role of the welfare system). The aim is to test whether these trends depicted in some countries, can be generalized on a wider scale and reveal a systematic pattern worldwide.

³Stiglitz, J. (2015, February 18). Why the Rich Are Getting Richer — and Why It Could Get Much Worse (L. Parramore, Interviewer). Retrieved from https://www.huffingtonpost.com/lynn-parramore/joseph-stiglitz-on-why-th_b_6354948.html

Our analysis suggests that i) banking indicators tend to be associated with higher level of inequality, while stock market systems are found to enhance a more egalitarian income distribution; ii) a U-shaped pattern is depicted in data when the depth dimension is tested, suggesting that 'too much credit' is pro-inequality; iii) a non-linearity is overall confirmed also when data on aggregate private credit are disentangled according by the type of borrower. However, while a U-shape relationship is found between inequality and the household private credit, an inverse U-shape/negative linear is depicted, in most cases, between income inequality and the private credit lent to firms. Furthermore, iv) higher levels of spread are found to be positively linked to inequality. With respect to the interactions tested in the model, v) as an economy develops, finance tends to exacerbate the level of inequality; iv) the real structure and the financial structure appear to exert a joint effect on income inequality.

The remainder of the paper is organized as follows. Section 2 presents an *excursus* of the previous works (both theoretical and empirical) and the related literature; in section 3 the methodology and the main data sources are described. In Section 4 the results of the empirical analysis are reported and in Section 5 the robustness check is shown to validate the main results of the analysis. Section 6 discusses the main results and presents the main shortcomings and future improvements; Section 7 concludes.

2 Literature Review

The topic discussed in this work stems from different but closely related strands of literature and it relates to current policy debates: the one studying the link between income inequality and economic development (Aghion & Bolton, 1992; Galor & Moav, 2001; Mookherjee & Ray, 2002]; the broad literature dealing with economic growth and financial development (Beck et al., 1999, Rioja and Valev, 2004a,b, Archand et al., 2015); this paper also relates to a body of work dealing with market imperfections and financial frictions, where the role of collateral plays a crucial role in presence of credit constrained agents (Greenwood and Jovanovic, 1990; Banerjee and Newman, 1993) and last, but not least, the strand analyzing the effects of private credit decomposition among household and firms on economic growth and income inequality (Gine and Townsend, 2004; Beck, Levine and Levkov, 2010; Beck et al., 2012).⁴ One of the first pioneer in studying the

⁴With imperfect financial markets the presence of financial frictions, such as credit constraints, make economic opportunities to vary remarkably across agents. This may occur with respect to two main dimensions: a 'vertical' one, which refers to the lack of parents' education which can perpetuate the inequality; the 'horizontal' one, seen as the inability to get financial resources to use for personal purposes (in terms of endowment). The credit constraint, then, becomes the mecchanism channel transmission

link between economic development and inequality is Kuznets (1955). What he finds in the data depicts an *inverted U-shape*, suggesting that in the early stage of development every country eventually experiences a certain degree of inequality. Eventually it will reach its peak and will decrease as the country developes. Economic growth, according to his view, is first detrimental and then beneficial for the level of equality in the process of development. He stresses the role of structural change and intersectoral movement of income and employment across the sectors as a potential source of inequality. However, what role does finance play in this process? Both theoretical and empirical works have been developed with the purpose to finally address the research question; whether the financial development is or is not harmful for income inequality.

2.1 Theoretical considerations and related literature

One of the most influent work is the one developed by Greenwood and Jovanovic (1990), which predicts a *non-linear inverted U-shape relationship* between financial development, income inequality and economic development. They predict that the overall effect of financial development on economic development is beneficial and growth enhancing, by efficiently allocating capital (and thus facilitating investments in infrastructures). However, in terms of distributional effects, the level of financial development will have a twofold effect: in the early stage of development, few people (the rich ones) will be able to afford to undertake the profitable investment (due to the fixed cost which has to be paid to join the intermediation sector). Hence, at the beginning, the poor will not be capable to access financial markets and will save less. In that way, they have a slow accumulation of capital and income inequality will widen. However, at higher levels of economic development a larger proportion of agents will eventually get access to financial services (as the fixed entry cost is fixed) and this eventually will narrow the income inequality. Their model predicts a long-run convergence in inequality. Similarly, Aghion and Bolton (1997) set up a model allowing moral hazard as a source of capital market imperfection, dividing the society into three classes: very wealthy, middle class, and poor, each of them with different investment capabilities. They conclude that government intervention aimed at redistributing wealth from the rich to the poor and the middle class, can lead to greater equality (in terms of opportunities). Moreover, they predict a non-linear relationship: at the beginning the capital accumulation process makes inequality higher, but eventually it tends to reduce it.

to perpetuate inequality over time (according to the 'new classical approach', see Mooknerjee and Ray (2003)).

On the other hand, there are some works which do not predict a convergence in the long-run, but explain how divergence can take place because of capital market imperfections and indivisibilities. Indeed, Galor and Zeira (1993) provide a theoretical model with bequest motive where they explain the mechanism of persistence in inequality over time, by studying the effect of wealth distribution on growth through investment in human capital (HK) with imperfect credit markets.⁵ What they come up with, is an economy which displays 'polarisation' of income and lack of convergence in the long run (contrarily to the neoclassical theory): an economy which is initially poor will end up poor; the same holds for rich economies. An economy with an initial large amount of wealth held by few agents will end up poor in the long run. They predict that countries displaying more equal wealth distribution grows faster and has higher income levels in their process of development and that countries with higher levels of income per capita show lower level of inequality (negative linear relationship).⁶. Similarly, Benarjee and Newmann (1993) build a three sector model with indivisible technologies and with capital market imperfections. Only the rich (which can become entrepreneurs) can borrow resources to invest into the indivisible and profitable investments. In this model, the initial wealth distribution is crucial to perpetuate inequality over time. More recently, Galor and Moav (2001) present a unifying theory which combines together the (asymmetric process of) accumulation of physical and human capital, showing how these two factors affect inequality.⁷ Indeed, in the early stage of development, physical capital is the primary engine of growth and it boosts growth at the expenses of the poor, whose marginal propensity to save is lower and then inequality widens; as the economy develops (by accumulating physical capital), the rate of return of human capital increases and then HK has been accumulated, by replacing the physical one (because of capital-skill complementarity). The effects of inequality will then depend on the return of the human capital relative to the capital one.⁸

⁵They justify the income differences across economies not taking into account the different technology, but the amount of investment in human capital, given the distorsion in financial market. What prevents perfect inequality to occur is the presence of market imperfections, since agents cannot insure themselves against income shocks in the future.

⁶They highlight as Easterly (2001) the importance of the middle class in the process of development: a country with a larger middle class is more likely to grow faster and better.

⁷The 'classical' approach predicts that inequality stimulates physical capital accumulation and promotes growth. The 'modern' paradigm states that in economies which are enough wealthy, less income inequality promotes investment in human capital and boosts economic growth as well.

⁸Stockhammer (2009, p. 53) states that "overall our findings support the view that income distribution has changed due to globalization in production and finance; changes in the bargaining power between capital and labour rather than through technological change."

2.2 Empirical approach to inequality-finance nexus

An increasing amount of empirical works investigate this finance-income inequality link, being sometimes inconclusive in results, as they predict a different trend in the relationship. Accordingly, the theoretical hypothesis have been tested on the data (mostly with respect to the 'depth' dimension of financial development) and different conclusions have been reached.⁹ Some authors have found empirical evidence about the existence of a negative linear relationship, ('*narrowing hypothesis*'), according to which financial development should narrow the level of income inequality and be beneficial for the convergence towards a fair income distribution. More specifically, Clarke, Xu, Zou, (2006) perform an empirical analysis in a panel of 83 countries during the period 1960-1995. They investigate how financial development (measured by the private credit as a share of GDP and by the share of the bank assets) affects income inequality.¹⁰ By using a cross country analysis and a random effect panel estimator, they conclude that there is no evidence of non-linearity in the data and more developed markets display less financial frictions, which eventually reduces the level of inequality.

Beck et al. (2007) find that financial development disproportionally boosts the income growth rates of the poorest quintile; it reduces the level of income inequality and alleviates poverty. Moreover, they find no evidence of non linearity. Kappel (2010) includes both the loan markets and the stock markets in his analysis, by using some proxies to measure them quantitatively.¹¹ His results confirm that financial development exerts a low -but still significant- linear negative effect on income inequality. Furthermore, finance seems to decrease the level of poverty, to a greater extent, by confirming it is a pro-poor process.¹² Ang (2010) studies the effect of financial development and financial sector reforms on income inequality in India from 1951 to 2004, by implementing the Error Correction Model (ECM). His results support the view in line with the negative

⁹Afterwards it is going to be more clear the multidimensionality of financial dimension. In this case with 'depth' I refer to 'the intensive margin' of the financial development, that is the amount of private credit which has been lent to households and firms, that are the non-constrained agents who own enough collateral to be able to borrow resources. It refers to a quality improvement of financial services without broadening their access (Hann and Sturm, 2016). The 'extensive' margin instead refers to the access to financial services by those agents who had been previously credit constrained.

¹⁰The authors motivate their choice to use private credit as a share of GDP instead of the 'broad money' aggregate $\frac{M2}{GDP}$ because the former one does not include the credit to government and state owned enterprises, nor the liabilities of central banks.

¹¹He uses private credit as share of GDP as proxy for loan market; stock market capitalization on GDP, total value traded and stock turnover as proxies for the size and the liquidity of financial markets.

 $^{^{12}}$ He identifies two main ways through which financial development affects income inequality: a direct one, via a better access to financial services (microcredit, microfinance); an indirect one, due to better investment opportunities for firms to boost their economic performance and employment.

linear hypothesis, that is, financial development contributes to reduce income inequality. Conversely, financial liberalization seems to exacerbate it. He does not find any significant effect of stock market development on income inequality, nor support of a non-linear relationship. Hamori and Hashiguchi (2012) in their panel of 126 countries, in the period 1963-2002, apply both a static fixed effect panel and a GMM dynamic panel methodology to address the impact exerted by financial development and openness on income inequality.¹³Their results suggest that financial development reduces income inequality.

Another strand of literature supports the 'widening hypothesis' which predicts a positive linear relationship between financial development and income inequality. Haan and Sturm (2016) analyze in a sample of 91 countries, from 1973 to 2005, the effects of financial development, banking crises and financial liberalization on income inequality by taking into account a wider set of financial development. They find that all three enhance the level of inequality and that the impact of financial liberalization on income inequality is conditioned by the level of financial development and the quality of institutions. Seven and Coskun (2016) examine whether the financial structure (bank based versus stock market based) contributes to reducing income inequality and poverty in emerging markets. Financial development promotes economic growth as well, but this doesn't necessarily benefit those in low-income levels in the emerging markets. In addition, bank based structure tends to increase inequality, whilst the stock market structure seems to be independent by income inequality.¹⁴

In some more recent works, data have revealed a non linear relationship, in accordance to an 'Inverted U-shaped Hypothesis'. The first contribution comes from Roine et al. (2009), who study the effect of financial development (measured in terms of depth) and other possible determinants of income inequality (trade openness, size of government and economic growth) on the top percentile in a panel of 16 advanced economies over a long time span, (1870-2004).¹⁵ Their analysis highlights that financial development has been pro rich over the past century but it exerts a negative effect in the poorest percentile. They conclude by stating that financial development can have great redistributive consequences within the high-income earners; however their effects in terms of the whole distribution are much more limited and of small entity. Similarly Nikolosky, (2013), implements a dynamic GMM panel analysis to control for endogeneity, unob-

¹³They describe the financial deepening as growth in the scale of financial transactions and as expansion of the balance of financial assets relative to the real economy.

¹⁴They do not find any relationship between the bank structure proxy and poverty, justifying it with push and pull factors, such as lack of collateral, culture, policies, stage of capitalism development.

 $^{^{15}}$ The reason why they focus on the top percentile stems from the greta amount of heterogeneity within the right tale of income distribution and there are remarkable differences between the 1% percentile and the 0.1% percentile.

served heterogeneity and reverse causality, in his heterogeneous panel of countries over the time span 1962-2006. He tests empirically the linear and non-linear hypothesis and he not only concludes that data display an inverted *U-shape*, but also measures the turning point (when private credit as a share of GDP > 114%).¹⁶ Jauch & Watzka, (2012) test the same hypothesis on a sample of 138 countries between 1960 and 2008.¹⁷ They document that a high level of income inequality may boost economic growth in terms of incentives but at the same time 'too much inequality' may lead to inefficiency with respect to political and social instability, by affecting the economic outcome badly. Indeed, in their view, high levels of financial development (measured in their work by the 'depth' dimension, that is the private credit as share of GDP) should, on one hand, encourage more agents to take risks (which should be reflected in an increase of income inequality); on the other hand, the number of households and firms among which to share this risk should increase (and this should lower income inequality).¹⁸

A few studies have depicted and confirmed a 'U-shape Hypothesis', according to which financial development, in its intensive margin, decreases income inequality for low and intermediate levels of credit. The higher levels, on the other hand, displays an upwards trend. Tan & Law (2014) analyse a sample of 35 developing countries (with the aim to reduce the considerable cross country heterogeneity) from 1980 to 2000 and they find that financial development (measured by bank and stock market indicators) narrow income inequality only in the early stage of development. They also control for institutional environment, such as the level of corruption, depicting a significant nonlinear trend in data. While bank indicators appear to be significant, they do not find any link between the stock market variables and income inequality.

The previous works rely mostly on the aggregate value of private credit to analyze the effect exerted by the size of financial development on inequality. Yet, not many works have tested the impact of credit decomposition on the level of income inequality, that is the credit given to household and firms. In literature there has been (yet limited) more attention focused on the effect that this decomposition does exert on growth, rather than in terms of income distribution. One of the first of a few attempts to connect

¹⁶He also includes some other control variables to control for macroeconomic stabilisation, institutional development and government spending.

¹⁷They implement a pooled regression analysis, followed by a static fixed effect and GMM dynamic panel analysis. To check for the robustness of their results they also estimate their model in fist difference and by excluding from the analysis the countries with $\frac{private_credit}{GDP} > 150\%$; by excluding the time interval preceding the financial recession, 2005-2008; dropping from the sample the 'opaque island' (Bahmas and Mauritius) and all those very small countries, whose population is smaller than 500.000 inhabitants.

¹⁸See Bonfiglioli (2011) for details about the link, in presence of market imperfections, between income inequality, investor protections, risk taking and risk sharing.

credit decomposition and inequality is found in Beck, Rioja, Valev (2012), by using the time span between 1994 and 2005. Their results show that enterprise credit is significantly associated with faster reductions in income inequality, whereas household credit is not. More recently, Bezemer and Samarina (2016) in their study of 26 European countries between 1990 and 2012, conclude that the debt shift in the 90's has had a considerable impact on the level of inequality. More precisely, they disentangle the bank credit lent to household and non-financial firms (business credit), from that one borrowed by the FIRE-sector (Finance, Insurance, Real estate). This involves mortgages and loans to financial business. What they argue is that, in the first case, the level of income inequality decreases, but in the second case it rises remarkably. They justify their results by stressing the more direct channel existing between the business credit and the macroeconomic variables dynamics, such as investment,wages, demand, employment and, more generally how they have higher real impacts on the economy.

Our work investigates the relationship between finance and income inequality, by taking three main dimensions into account: *structure*, *size* and *efficiency*. The questions that this empirical study has the purpose to answer are multiple, in order to deeply clarify the potential mechanisms through which finance may affect the income distribution within countries. Indeed, we aim at testing i) whether financial structure matters for income inequality; ii) the non-linearity between the size dimension (financial deepening) and inequality; iii) whether, for higher level of inefficiency and imperfections in the credit market, also higher level of inequality are observed. Besides, given the gap in the literature or, in some cases, the few works developed, two additional original contributions have been apported to this analysis,: first, we want to test if the real structure of the economy determines how financial development may affect inequality. Second, we want to analyze whether it matters who gets the credit between non-financial firms and households by studying the effect on inequality (to the best of our knowledge, this is the first paper using the disaggregated data to analyze the effect on inequality from the BIS dataset and by also expanding the time span to more recent years).¹⁹

¹⁹We also test whether the level of economic development may condition the way in which finance affects inequality. In the methodology section the econometric specification will be explained more in details .

3 Empirical analysis

3.1 Data and sources

The analysis applies to a heterogeneous sample of 121 economies (19 low-income, 25 low-middle income, 34 upper-middle income, 43 high income according to World Bank classification, see the Appendix for a detailed description) over the time span 1963-2008 when *EHII* index is used as dependent variable.²⁰ Instead, when the net and gross Gini are implemented as proxy for income inequality, the sample includes up to 143 economies (24 low-income, 33 low-middle income, 43 upper-middle income and 43 high income economies), between 1960 and 2014.²¹ Data have been collected by taking recourse to several datasets: the EHII index ('Estimated household income inequality') from the UTIP-UNIDO ('University of Texas Inequality Project' - 'United Nations Industrial development Organisation') dataset and the SWIID ('Standardized World Income Inequality Database') as measure for income inequality; GFDD ('Global Financial Development Dataset') for the financial indicators, WDI ('World Development Indicators') from the World Bank for control variables and from the BIS ('Bank of International Settlement') the disaggregated data on the private credit (see Appendix).

3.1.1 Income Inequality

For the purpose of this analysis, the *EHII* indicator is our first measure of income inequality.²² It is based on individual wage income, developed by the University of Texas Inequality Project (UTIP 2008). It ranges from 0 (perfect equality) to 100 (perfect inequality). It is constructed by regressing first the Deininger and Squire Gini coefficient on the UTIP-UNIDO Theil pay inequality index (which measures the dispersion of wages within the manufacturing sector, as indicator of sector specialization) and other control variables (such as the different income measures of Deininger and Squire's dataset, the manufacturing share of the population and some dummies accounting for different characteristics of data, ie. the reference unit). Then, predicted values are used as estimates for the *EHII* indicator.

²⁰All data about inequality display, unfortunately, some gaps over different years and missing values, which make the dataset unbalanced. In this specif case, the EHII dataset has been updated in 2008, which justifies the time span from 1963 until 2008 for our analysis.

²¹Following Solt, some countries whose standard errors were too large and had too few observations, especially in the initial years, have been removed from the sample, with the aim to limit potential bias in the estimates. The countries dropped out of the sample are Morocco, South Africa, Kenia, Malawi, Jamaica, Sierra Leone, Swaziland.

²²For a thorough description of EHII2008 indicator, see http://utip.gov.utexas.edu.

Data based on average income of representative groups of people (different by industry or sector or even region) 'may also contain a sufficiently large share of information on the evolution of inequality', so as to serve as good instruments for the movement of the distribution as a whole' (Galbraith, 2008). The disadvantage of EHII will be because it is a wage-based measure and it does not include pensions, agricultural wage and income from self-employment (Deininger and Squire, 1996). However, it provides information on individuals, not on households (or mixed data) as in Deininger and Squire (hereafter DS).²³ Indeed, the DS 'high quality' dataset is characterized by some inconsistencies and lack of accuracy and comparability, due to the practice of mixing together different types of data, such as gross versus net income, individual versus household level and expenditure versus income data. In the attempt to correct these issues and to clear the data, estimation results might be subject to measurement errors and bias. (Gimet, Lagoarde-Segot, 2011; Atkinson and Brandolini 2001). Although the EHII indicator is also far from being a perfect proxy for income inequality, it is still, to the best of our knowledge, the most reliable indicator for the purpose of this analysis. Indeed, data are also comparable across and between countries and over a reasonably long time span.

For completeness, the inequality *Gini index* (both net and gross) from the SWIID dataset (Standardized World Income Inequality), developed by Solt in 2009 and updated in 2016, will be used to perform the whole analysis from 1960 to 2014 (yet, these two dataset are to consider more as complementary rather than substitute to *EHII*). However, one of the issues related to this dataset is that not only data are estimated, but also missing values are imputed. However, it "represents a particular choice in the balance between comparability and coverage: it maximizes comparability for the broadest available set of country-year observations" (Solt, 2009). It also takes into account the possible uncertainty in the estimates related to the paucity of data, especially in developing countries. Hence, we also take recourse to this measure as second inequality indicator in this study. ²⁴ Moreover, the choice to use both indicators, the gross and net gini, is important as they may differ remarkably, given to different redistribution policies.

²³The distinction between household and individual level matters in case "there are systematic differences in the size of rich and poor households" (Delis, Hasan & Kazakis, 2013).

²⁴To complete the analysis on income inequality, also income deciles are used to test which kind of relationship does exist between FD and inequality. A higher value of the bottom decile is associated to lower inequality, while higher level of the top decile is linked to a higher level of inequality. (Iyigun and Owen, 2004). Results are available upon request. However, the coverage of data is more limited than the inequality indicators presented in this section.

Variables	Type of indicator	Definition	Sources
gini_net	Inequality	Net level of the gini index of inequality.	SWIID
gini_gross	Inequality	Gross level of the gini index of inequality.	SWIID
EHII	Inequality	Estimated Household Income Inequality	UTIP_UNIDO
bankdepgdp	Structure	Bank deposits to GDP $(\%)$.	GFDD
bankprivcredit	Structure	Credit provided to private sector by domestic money banks (%GDP).	GFDD
stockmktcap	Structure	Stock market capitalization to GDP (%).	GFDD
$tot_valtraded$	Structure	Stock market total value traded to GDP $(\%)$.	GFDD
privy	Depth	Private credit divided by GDP	GFDD
spread	Efficiency	Bank lending-deposit spread.	GFDD
turnover	Efficiency/ Structure	Stock market turnover ratio (%).	GFDD
firmscred	Depth	Share of private credit lent to firms.	BIS
householdcred	Depth	Share of private credit lent to households.	BIS

Table 1: Description of variables

3.1.2 Financial Variables

Since the main purpose of this work is seeking which kind of association, if any, exists between multiple dimensions of financial development and income inequality, we must include different financial variables. All of them are taken from the GFDD (Global Financial Development Dataset) and from the BIS (Bank for International Settlements). The dimensions are chosen according to a twofold criterion, by following the previous literature and by taking into account the availability of data. An occurring problem is the difficulty of finding data, especially for the poorer countries, as they are not always reliable in terms of quality. However, three main dimensions have been identified, aiming at isolating, in a comprehensive way, some important channels through which FD may affect inequality: structure, depth (or size of financial intermediation) and efficiency ²⁵

Structure The first dimension focuses on financial structure, more specifically banking versus stock market system. These two different structures might indeed perform the same functions, such as monitoring, screening and, in general, channelling savings and investments (Dow and Gorton, 1997). Yet, in the case of saving-investment process, banks act as intermediaries, in such a way that they issue securities bought by households in exchange of money, which will be invested in lending activities to borrowers. Inversely, in capital markets, households with resources will buy directly the stocks issued by the firms operating in the market. They might also differ in the way in which they process information, as stock markets tend to embraces new technologies easily, while banks are more conservative and less dynamic (Allen and Gale, 1999). Hence, in

 $^{^{25}}$ We are aware that not all the multiple aspects of financial dimensions can be tested, due to lack of data as, for example, the breadth dimension (accessibility to financial services). Nevertheless, there is still not enogh information to be exploited for many countries and over long horizon. This justifies the choice not to include them in this work.

light of these similarities and differences, it seems reasonable to wonder whether and how these different structures do affect inequality. To represent these two systems, different indicators are included. With respect to the banking system, the amount of total saving as percentage of GDP (*bankdepgdp*) and the amount of banking credit provided by domestic money banks (*bankprivcredit*) are used to capture both the size and the activity of the banks. Likewise, with respect to stock market system, in line with the previous studies, the stock market capitalization as percentage of GDP (*stockmktcap*) the total value traded in the market (*tot_valtraded*) and the turnover ratio (*turnover*) are implemented in the analysis.²⁶ In this way we account respectively for the size and the liquidity of the market. Other similar variables are used to perform the robustness check.

This is the dimension that has been tested the most in the previous literature Depth on inequality and financial development. It represents the intensive margin of FD and it captures one of the key activities of financial intermediation, to channel resources from savers to private sector. Accordingly, the variable used as proxy for this dimension is the amount of private credit by deposit money banks and other financial institutions as percentage of GDP (privy).²⁷ The relevance of this variable in this kind of analysis matters, as 'too much credit' can affect considerably the economic system both at micro and macro level, in terms of misallocation of credit and because of the link between leverage and instability in presence of shocks (Honohan, 2003). Indeed, the non-linearity hypothesis will be tested in order to depict the occurrence of any non-monotonicity in the data. In addition, since this analysis also focuses on the effect of credit composition on inequality, the data of BIS and, more precisely, from 'Long series on credit to the private nonfinancial sector' are used to disentangle the percentage of credit lent to households (householdcred) and the one borrowed by non-financial firms (firmscred).²⁸ The idea behind is that firms might be more linked to the production and investment channel,

 $^{^{26}}$ The turnover indicator is considered both a structure and efficiency indicator of stock market development. It is measured as $\frac{tot_valtraded}{stockmktcap}$, so that it provides a measure of liquidity relative to the size of a market.

 $^{^{27}}$ As robustness check, the amount of liquid liabilities (*lly*), or broad money, is included since it is a proxy for the size of intermediation sector, as it accounts for all the kinds of financial institutions (Beck, Kunt, Levine, 2009).

²⁸The disaggregated data are available starting from different years, for a subsample of 42 countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republik, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Republic of Korea, Luxembourg, Malaysia, Mexico, Netherlands, New Zeland, Norway, Poland, Portugal, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States.

which can be closely related to the hiring channel and employment.

Efficiency The level of distortion in capital and credit markets might exert an impact on the level of income inequality. The spread, defined as the difference between lending rate and deposit rate, is the variable for the efficiency dimension.(*spread*). This is a proxy of the degree of market imperfection (Acemoglu, 2002) and of competition's level in the banking sector. High spreads may signal a higher perceived risk by lenders, who charge extra fees to insure against borrowers' default, by leading to a greater risk (Allen and Gale, 2000). At the same time this also might intensify the exclusion from the credit market, as some agents might be credit constrained and being unable to provide enough collateral. Moreover, with low level of competition, banks can also increase their mark-up and monopolistic power. Therefore, the higher the spread, the more inefficiency should be depicted in the market and, accordingly, more inequality is expected to occur.²⁹

3.1.3 Conditioning information set

For the purpose of this analysis different controls are included, in line with the previous studies on the determinants of income inequality. The main sources are the WDI (World Development Indicator) and the Penn World Table. The complete list of the main control variables is reported in the Appendix. As the analysis will take into account fixed effects, no time invariant variables will be included. First, we control for the level of economic development, by using the logarithm of GDP per capita (logGDPpc), to control for the macroeconomic stability we include the inflation rate (infl) (this may influence the level of nominal wages and this is related to the strength of labor union).³⁰ We also take into account the size of the countries in terms of population (ln_pop) to control for demographic factors. The level of unemployment is included, as it may hurt more the low income groups (Van Arnum and Naples, 2013). To test some interaction hypotheses, related to the real economy structure and modified Kuznets hypothesis, the different value added share in agriculture (agrva), industry (indva) and service (servva)

²⁹As pointed by Honohan (2008), this variable depends on the credit, on the maturity risks, and also on the monitoring costs. Hence, it might be difficult to perform a cross-country comparison. By keeping this in mind, this proxy is included in the set of variables, as, to the best of our knowledge, is the the most appropriate proxy for which data are available over a large time span and for a considerable number of countries.

³⁰Moreover, insuring from future and incertain inflation might be costly and prohibitive for some agents (Bulíř, 2001). When prices go up the real value of cash held by agents decrease, while the wealthy groups, holding asset other than currency, might be better protected and insured against inflation uncertainty. Inflation then, might hurt more the poor and the group at the bottom of the income distribution and it may lead to an increase of inequality.

are also added to the model (Nikolosky, 2013; Clarke, Xu and Zou, 2006). This is to stress the importance of changes in the real structure of the economy. We also include the government expenditure as percentage of GDP (govgdp) and the trade openness, defined as the sum of export and import as percentage of GDP (trade). With respect to these variables, the effect that they might exert on inequality is uncertain. Public expenditure could be very effective to contrast the level of inequality, if allocated in an efficient way, by affecting especially the poor (through redistributive policies); if, instead, the public resources are spent on the rich, then, this variable may exacerbate the level of inequality (especially whether the rich have political connections). When it comes at trade openness, the Heckscher-Ohlin theorem, explains the differences between countries in terms of differences in factor abundance and different levels of productivity. Hence, it is a model which sheds more light on income differences across countries, rather than inequality within countries. Finally, some proxy for human capital are included, more precisely, the enrollment in secondary (enroll secondary) and/or tertiary school (*enroll tert*). The effect of education on inequality may vary considerably, according to the type of education system (whether is free or not) and also the premium acquired from any additional gain in school enrollment, or more generally in accumulating human capital (Hugget et al., 2011).

3.2 Methodology

The annual panel data takes into account the time dimension and how this relationship has been evolving.³¹ In the baseline model, the fixed effects estimator is applied to take into account the potential endogeneity issue, which may arise due to omitted variables and unobserved specific country effects, given the size and the heterogeneity of the sample (Li & Zou, 2008; Jauch and Watzka, 2012; Park & Shin, 2015).³² By implementing the fixed effect estimator, we control for all those time invariant variables which may affect inequality (such as inequality adversion preferences, cultural and religion factors, historical background, legal and political systems, etc). Moreover, both country effects

³¹Annual data may be noisy due to cycles, whereas five-year averages lead to a more balanced panel and smooth out possible flactuations. However, the latter one reduces remarkably the amount of observations. Therefore, I decide to implement both analyses (since the short run is as important as long run) and also, to avoid possible reverse causality, we lagged financial variables by one period and results are, in general, confirmed.

 $^{^{32}}$ However, Barro (2000) argues that country fixed effects estimator would eliminate all the crosssectional information in the data, which is the dimension, according by his words, which counts the most in studies on inequality. Therefore, also because the Hausman test is, sometimes, not fully reliable, as robustness check we will perform the analysis by implementing the random effects estimator. Results are available upon request.

and time fixed effects are included in the regressions, to control for common international shock and potential trend that might be depicted in the data (financial sector, for example, experienced an increasing pattern around the 80's). Three different model specifications are estimated:³³

$$Y_{i,t} = \beta_0 + \beta_1 F D_{i,t} + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t}$$
(1)

$$Y_{i,t} = \beta_0 + \beta_1 F D_{i,t} + \beta_2 F D_{i,t}^2 + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t}$$

$$\tag{2}$$

$$Y_{i,t} = \beta_0 + \beta_1 F D_{i,t} + \beta_3 Interactions_{i,t} + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t}$$
(3)

i defines each country in the sample, *t* refers to the time (annual data or 5 year average data); γ is the time fixed effect to control for aggregate shocks and trends, α is the country specific effect; $Y_{i,t}$ represents the income inequality measures (*EHII*, gini_net, gini_gross) the $FD_{i,t}$ refers to the set of variable of interest accounting for financial development; $X_{i,t}$ are the control variables described in the previous section and $\varepsilon_{i,t}$ is the error term. The model (1) is tested on the structure and the efficiency dimensions, while the specification (2) is restricted to test the non-linear relationship between the measure of income inequality, the financial deepening (privy) and also the decomposed credit between households (householdcredit) and firms (firmcredit). The model (3) is specified to test the two main interactions of the model that may condition the impact of financial development on inequality. Firstly, we test whether the effect of FD on inequality may depends on the level of GDP per capita (proxy for economic development), as recently increasing levels of inequality have been observed in advanced economies (Beck, Kunt and Levine, 2007)

$$\beta_3(FD_{it} \cdot \log _GDP_pc)$$

Secondly, structural change and the real structure of an economy are part of economic development and there is some evidence that the real structure may affect the financial structure (Allen, Bartiloro, Kowaleski, 2005).³⁴ Therefore, we want to test whether

³³A more parsimonious model has been first estimated where none of the control variables have been included (available upon request).

³⁴Allen, Bartiloro, Kowaleski, 2005 is the first work which study the relationship between financial and real structure. They argue that the real economy structure can determine the financial structure. The demand from the economy determines the evolution of financial sector (demand lending approach). Capital intensive based economies (industry) are more bank oriented and dependent on external finance;

the real structure of the economy and its changes can determine the degree of which finance may affect income inequality.³⁵ More precisely, we test whether economies which are more stock market based and more intensive in the service sector exert a different impact on inequality, compared to industry and bank based economies. In the first case, inequality could on one hand rise, according to Piketty (1997). This is because of the prominent role of speculation and financial services in the economy (with the increase in the top income distribution). On the other hand, these stock markets are usually more developed in countries with a better quality of institutions and education access (which is related to less inequality, see Kpodar, Singh, 2011), and then they could display a more equal income distribution. The reason of this hypothesis stems upon the recent trends observed in the economy worldwide. An increasing level of inequality has been recently reported in Anglo-Saxon countries, such as UK and United States (with developed stock exchanges and considerable level of production in financial services). On the other hand, countries like Germany or the Scandinavian economies, specialized in industrial production and heavily relying on banking systems, tend to report a lower level of inequality (the role of redistribution policies and welfare in these economies play a crucial role). To the best of our knowledge, this is the first paper aiming at testing this interaction:³⁶

 $\beta_{3}(stockmkt_structure_{i,t} \cdot serviceV.A\%_{i,t})$ $\beta_{3}(bank_structure_{i,t} \cdot industryV.A\%_{i,t})$

However, fixed effect estimator can't take into account the possible endogeneity due to reverse causation, which might arise between inequality and financial development. The latter one might indeed be endogenous itself. Accordingly, Stockhammer (2013) argues that rising inequality has contributed to boost the level of debt among low income households and, at the same time, has increased the propensity to speculate in financial markets, by highlighting how income inequality may also shape financial sector and its development. In addition, since the dynamics of inequality is slowly changing over time,

 $\alpha_{11}Finance_{it} + \alpha_{12}Finance_{it}^2 + \alpha_{13}Finance_{it} \cdot Modern_{it}$

whilst the more human capital and knowledge intensive firms are more stock/financial market oriented. ³⁵Clarke, Xu, Zou (2002) already tested an '*augmented Kuznets hypothesis*', where they regress the measure of income inequality on a functional form (by also including control variables) such that:

Where *Modern* refers to the non-agricultural sector. They find $\alpha_{13} > 0$.

³⁶We also test this interaction by creating a "real structure" indicator, as a ratio between $\frac{industry(VA\%)}{industry(VA\%)+service(VA\%)}$ (to better identify the economies more industry or service based) and make it interact with the banking and stock market system. Results are available upon request.

it is very likely that some degree of persistence is present in the data.

Hence, an alternative to fixed effect estimator, in the absence of external valid instruments, is the dynamic GMM estimator (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). The assumptions on the data generating process, which justify the implementation of GMM estimator, are several (Roodman, 2009): the process is suspected to be dynamic, with current values of the dependent variable being influenced by its own past realization; there may be individual fixed effect; the presence of some endogenous variables (in this case the financial regressors); some predetermined variables may not be strictly exogenous (they are independent on current errors but they may be influenced by past disturbances); the data are such that T is small and N is relatively large (to be able to exploit asymptotic properties). Though, one of the issues potentially arising with this kind of estimator is the presence of weak internal instruments, which may consequently bias the estimates (Bound et. all 1995). In this set up the performance of the model depends crucially on the validity and on the quality of instruments. However, too many of them might increase finite sample bias (Bun and Kievit, 2003). Therefore, there is a trade off between the efficiency of the estimates and the small sample bias. Since the difference GMM estimator (Arellano and Bond, 1991) is known to suffer more from weak instruments (Bun and Windmeijer, 2010) and is less efficient in providing estimates, the system GMM estimator is implemented (Blundell and Bond, 1998) ³⁷.

3.3 Descriptive Analysis: some key facts

Before reporting and discussing the results of this work, it is perhaps interesting to look at some descriptive and preliminary graphs, which can give some insights on the relationship existing between income inequality and financial development. The sample on which the analysis is performed is extremely heterogeneous. Thus, it is worth to take a glance at a few graphs, which highlight some remarkable differences among groups of countries. Interestingly and in line with the recent reports on trends on inequality, as Figure 2 shows, the growth of *EHII* index between 1963 and 2008, is remarkably higher in high income countries, especially in OECD, while displays lower levels in low

³⁷Blundell and Bond (1998), prove that the system estimator is not as downward biased as much as the Arellano–Bond estimator. This estimator, as pointed out by Roodman (2009), works yet under certain arguably special circumstances. The problem of the optimal number of instruments and parsimony is tough common to every specification of the GMM estimator. There is not a clear indication or a predefined rule which indicates when the number of instruments are 'too many' (Ruud 2000). However, an excessive number of moment conditions lead to a proliferation of intruments '*counting quadratic in time dimension*', which can lead to several problems without, tough, compromising consistency (Roodman, 2009).

and middle income countries. In Figure 3, the growth rates of the net and gross gini measures over the time interval 1960-2014 are still higher in high income countries, yet the highest level in this case is observed in non-OECD countries and much lower in low and middle income economies. In Figure 4, the level of income inequality for each income group is shown. Low and low-middle income countries are the ones displaying higher levels of income inequality, being close to 50 (where 100 indicates perfect inequality). Figure 5, instead, highlights the level of net and gross gini, averaged over the sample period. In line with Solt (2009, pg.12), redistribution policies may play a remarkable role in lowering inequality within a country and in explaining differences across countries. This is confirmed in Figure 5, where the gap between the gross and the net gini measures in high income economies is wider, while in the rest of the sample this difference is less remarkable.





Figure 2: Growth rates of income inequality, by income group. Sources: author's calculation based on UTIP-UNIDO dataset.







Figure 4: Mean level of income inequality (EHII), by income groups. Sources: author's calculations based on UTIP_UNIDO dataset.

Figure 5: Mean level of income inequality (net and gross Gini), by income groups. Sources: author's calculations based on SWIID dataset (Solt, 2009).

With the aim of analyzing better, graphically, whether or not data display some interesting patterns, the scatter plot respectively in 2d and 3d are reported: the first one gives some preliminary insights on the link between the level of income inequality and the size of financial intermediation; the second one instead shows the relationship among three variables, income inequality, financial deepening and level of economic development to justify one of the interaction terms which we test in the third model specification (3).

As shown in the scatterplot in Figure 6, the suspect of non-linearity in data is confirmed, with respect to the *depth* dimension. It seems that for low and intermediate level of private credit, the level of inequality decreases up to a minimum point, followed by an upward trend (*U-shape* pattern), suggesting that high level of credit may exacerbate the income differences among individuals within countries. Of course, for this to be true and not speculative, the result has to be confirmed by the econometric model. However, it offers a valid and empirical justification to test the presence of a non-linear hypothesis with respect to the *depth* dimension. This seems to be confirmed, yet less remarkably, also when we look at the scatter 2D by using the other measures of inequality, that is the net and gross gini index, reported in Figure 7.³⁸ In this case though, this non-linearity seems to be of minor impact compared to Figure 7. To conclude this descriptive section (more tables are included in the Appendix, sub-section 2 or available upon request) in Figure 8 we show the 3D relationship depicted between the measure of *EHII* index, the

 $^{^{38}}$ The scatter between the gross gini and the proxy for the *depth* dimension is very similar and, for this reason, has not been included. See Appendix for the relative graph.

level of economic development (log GDPpc) and the proxy for the financial intermediation (privy). For low levels of financial deepening and economic development, the level of inequality appears to be high. For increasing levels of economic development and financial deepening the level of inequality slightly decreases. However, for very high levels of both financial and economic development the level of the EHII index increases and some observations are indeed concentrated in the right upper left area of the graph. Similar patterns to the one shown in Figure 8 are observed when all the financial variables are interacted with economic development proxy.



Figure 6: Scatter 2D displaying the relationhip Figure 7: Scatter 2D displaying the relationship between the EHII index and the level of financial deepening. Sources: Author's calculations based on the financial dataset.

between the net gini index and the level of financial deepening. Sources: Author's calculations based on the financial dataset.



Figure 8: Scatter 3D between gross gini, depth dimension and level of economic development.

4 Results

In this section the main results of the analysis are presented, with respect to the different specifications of the model, both for the annual analysis and for the 5 year average estimates.³⁹

4.1 Annual Data analysis

The results of the first model specification (1) are presented in Table 2. For the sake of brevity, only the financial variables' coefficients are reported (see the Appendix for the complete tables). With respect to the efficiency dimension, the coefficient of spread is positive and significant at 1% level, when both the variables EHII and net gini are used as income inequality measures. When *gross gini* is the dependent variable the sign of the coefficient is negative but not significant. Moreover, the size of the coefficients are very similar too: a unitary increase the spread variable leads to an increase of the level of income inequality respectively, by 0.034 and 0.046 p.p. This result seems to be in line with the initial hypothesis suggesting that for higher level of inefficiency (indicating less degree of competition in the banking system) and market imperfections, the level of inequality tends to rise. The second and third set of regressions are aiming at analyzing the effects exerted by stock market structures on the level of income inequality. First the stokmktcap is regressed on the measures of income inequality and the controls described in the subsection 2.1.3. A negative and significant relationship is depicted between the size of stock markets and income inequality. Indeed, the coefficient is significant and close (in absolute value) to 0,01 percentage point when EHII and the gross gini are used as dependent variable. Similar results, in terms of size and signs, are found when the other proxy for stock markets system is included in the analysis. In this case tough, while an increase in totvaltraded leads to a decrease in the level of EHII and gross gini and it is pro-equality. The opposite holds when *qini net* measures inequality. In this case, indeed, the coefficient is equal to 0.0062 and it is significant at a level of 5%. This could perhaps be linked and justified by the role of redistribution policies, especially in advanced economies, where capital gains are not excessively taxed. In the last set of regressions of Table 1 the coefficient of banking structure indicators are reported. Overall, both the coefficient of *bankdepqdp* and *bankprivcredit* turn out to be positive and significant, mostly at 1% level. To briefly sum up the model specification (1), higher

³⁹The results by using the variables in levels are qualitetively similar to those ones in terms of elasticities when the model is expressed in logs (estimated as robustness check an also to avoid the potential heteroschedasticity and presence of outliers). These results are available in the Appendix.

1	EHII	gini net	gini gross	
spread	0.034**	0.046***	-0.007	
_	(0.0136)	(0.015)	(0.018)	
Observations	712	1,029	1,029	
N. countries	77	89	89	
R-squared	0.304	0.323	0.422	
Country FE	YES	YES	YES	
Year FE	YES	YES	YES	
Time span	63-08	60-14	60-14	
	EHII	gini net	gini gross	
stockmktcap	-0.006**	-0.001	-0.011***	
	(0.0024)	(0.0028)	(0.0035)	
Observations	780	1,160	1,160	
N. countries	73	81	81	
R-squared	0.357	0.167	0.401	
Country FE	YES	YES	YES	
Year FE	YES	YES	YES	
Time span	63-08	60-14	60-14	
1	EHII	gini net	gini gross	
totvaltraded	-0.01***	0.00626**	-0.01***	
	(0.0027)	(0.00255)	(0.0033)	
Observations	819	1.186	1.186	
N. countries	73	81	81	
R-squared	0.381	0.163	0.379	
Country FE	YES	YES	YES	
Year FE	YES	YES	YES	
Time span	63-08	60-14	60-14	
rime span	EHII	gini net	gini gross	
bankpriveredit	-0.002	0.013***	0.011***	
baikpriveredit	(0.002)	(0.010)	(0.001)	
Observations	906	1 323	1 393	
N countries	86	104	104	
R-squared	0.203	0.218	0.349	
Country FF	0.235 VES	VES	VES	
Voar FE	VES	VES	VES	
Time span	63-08	60-1 <i>4</i>	1 EDS 60-14	
rime span	53-00 FHII	gini not	dini gross	
hanledon ada	0.0194**		0.0100***	
ранкаердар	$(0.0124)^{\circ}$	(0.003)	(0.0190.1)	
01	(0.000)	(0.00571)	(0.007)	
Observations	881	1,292	1,292	
N. countries	85	103	103	
R-squared	0.298 MDG	0.208	0.348	
Country FE	YES	YES	YES	
Year FE	YES	YES	YES	
Time span	63-08	60-14	60-14	

Table 2: Estimates from annual panel data, model specification (1).

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	EHII	gini net	gini gross
privy	-0.0151*	-0.0195**	-0.00807
	(0.0091)	(0.008)	(0.010)
privy_2	0.00014^{***}	0.00013^{***}	0.00011^{***}
	(0.00)	(0.00)	(0.00)
$\log GDPpc$	1.182^{*}	3.988^{***}	5.488^{***}
	(0.614)	(0.642)	(0.81)
govgdp	0.02	-0.035	-0.0803*
	(0.033)	(0.037)	(0.046)
agrva	0.226^{***}	0.0757^{**}	0.0699*
	(0.039)	(0.03)	(0.04)
trade	-0.00974^{*}	0.001	-0.01
	(0.006)	(0.005)	(0.01)
inflat	-0.005***	0.104	0.163^{*}
	(0.001)	(0.07)	(0.09)
enrollsecondary	0.0332^{***}	-0.0188^{**}	-0.0173*
	(0.01)	(0.008)	(0.01)
unempl	0.143^{***}	0.174^{***}	0.382^{***}
	(0.024)	(0.026)	(0.033)
ruraltot	-0.0607*	-0.140***	-0.04
	(0.031)	(0.029)	(0.04)
ln_pop	1.682	-4.077***	-14.67***
	(1.072)	(1.214)	(1.53)
Constant	24.14^{***}	12.600	29.64^{***}
	(7.214)	(7.92)	(9.89)
Observations	873	1.323	1.323
N. countries	83	104	104
R-squared	0.201	0.218	0.357
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Time span	63-08	60-14	60-14

Table 3: Nonlinear estimates from annual panel data, model specification (2).

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

levels of inefficiency are associated to higher levels of inequality, a more stock market oriented financial structure tends to be inversely related to the level of inequality, while the opposite holds when banking structure is tested, which tends to increase it.

Table 3 provides the results of the model specification (2), to test the presence of non-linearity with respect to the 'depth' dimension (or size of financial intermediation). The estimates provided in Table 3 depict a non-linearity in the relationship between privy and the measure of income inequality. More specifically, it confirms the presence of a U-shaped trend. For low and intermediate levels of financial intermediation, the inequality decreases (the linear term privy is indeed negative and significant at 5% and 10% level). However, for increasing levels of private credit, the coefficient of the squared



Figure 9: Marginal effects of privy% on the EHII index. Sources: Author's calculations based on the final dataset.

term turns positive and significant at 1% level (despite its small size).⁴⁰ Figure 9 shows the marginal effect of the financial variable *privy* as % of GDP on the *EHII* index. This effect is first negative and then turns positive as the level of credit given to the private sector takes higher values. Same pattern is depicted with the net gini and gross gini and it still holds by removing the extreme values of *privy* (>150%).

One of the possible mechanisms which can explain this U-shaped trend is to find in the level of indebtedness of private agents, which, if extreme, may lead to default and this may exacerbate the level of inequality within the country. Indeed, it is more likely that, for higher level of credit, agents (both household and firms) are more vulnerable and sometimes incapable, in presence of negative financial shocks, to repay their original liabilities and this might widen the gap between different income groups. Alternatively, this result might be related to a misallocation of private credit among private agents, which might increase the inequality in an economy. Credit is, indeed, productive if allocated for profitable investment projects (education, innovation, etc..) which can exert some positive spillover effects, by boosting employment through the hiring channel, economic growth and development. Hence this 'domino effect' might be detrimental for the level of inequality. On the contrary, whenever credit is misallocated or limited to a certain amount of agents, the effects of it might be beneficial only for an *elite* group.

⁴⁰This result is also confirmed and even more significant with the alternative specification, by using the value of the financial variables lagged by one period. In addition, this analysis has been run also on different subsamples of countries, split accordin to their income group status (high, up-middle, lowmiddle, low). Results are available upon request.

	EHII	gini net	gini gross	EHII	gini net	gini gross
	(a)	(b)	(c)	(d)	(e)	(f)
firmscred	0.0885^{***}	0.0310^{***}	0.0271^{**}			
	(0.015)	(0.008)	(0.013)			
firms2	-0.000418***	-0.00001**	-0.000004			
	(0.0001)	(0.00003)	(0.0000)			
householdcred				-0.0332*	0.0392^{***}	0.0539^{***}
				(0.019)	(0.007)	(0.011)
household2				0.000463^{***}	not signif	not signif
				(0.00015)	/	/
$\log GDPpc$	-3.395***	-0.193	-5.773***	-5.374***	-1.653	-8.403***
	(1.165)	(1.129)	(1.819)	(1.242)	(1.101)	(1.837)
ln_pop	3.576^{**}	-0.913	-7.288**	-0.172	-4.300**	-14.11***
	(1.693)	(1.832)	(2.952)	(1.72)	(1.742)	(2.906)
govgdp	0.0827^{*}	-0.278***	-0.142	-0.0241	-0.381^{***}	-0.304***
	(0.044)	(0.054)	(0.086)	(0.044)	(0.052)	(0.087)
infatl	3.159^{***}	4.999^{***}	5.540^{***}	1.946^{*}	4.141^{***}	3.947^{**}
	(1.002)	(1.123)	(1.809)	(1.05)	(1.116)	(1.861)
trade	-0.0352***	-0.0192^{**}	-0.0318**	-0.0274***	-0.02***	-0.0308**
	(0.008)	(0.0077)	(0.012)	(0.01)	(0.0073)	(0.012)
$enroll_tert$	-0.0151*	-0.0214^{**}	0.00977	0.00101	-0.0193**	0.00738
	(0.0082)	(0.0097)	(0.016)	(0.008)	(0.0096)	(0.016)
Constant	53.51^{***}	38.70^{***}	120.3^{***}	88.61***	64.88^{***}	167.2^{***}
	(13.59)	(13.53)	(21.79)	(13.94)	(12.78)	(21.31)
		200	000	500	700	-
Observations	517	690	690	526	703	703
N. of countries	36	36	36	36	36	36
R-squared	0.568	0.446	0.502	0.566	0.468	0.517
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Table 4: Estimates from fixed effect panel estimation, model specification (2).

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4 shows the results of model specification (2) when data on private credit are disaggregated according to the type of borrower, whether a firm or a household. Since most countries of the subsample are advanced economies, the enrollment in tertiary school is used as proxy of human capital, as more representative. When the *EHII* index is used as the dependent variable, a weak yet strong non-linearity is depicted in the data. Interestingly, in regressions (a) an inverted *U-shape* relationship is depicted when the credit lent to non-financial firms are included in the model. Indeed, the linear term (*firms*) is positive and significant suggesting that a unitary increase in firms' private credit leads to an increase of *EHII* index by 0.089 p.p. Nonetheless, the square term (*firms2*) is negative and statistically significant, yet very limited in size, implying that credit given to non-financial firms can increase inequality up to a threshold (around 106% as ratio between the *firmscred* over the GDP), followed by a gradual and slow decrease. A similar inverted *U*-shape is confirmed also when gini net is regressed on firmscred and its square terms (regression (b)). Regression (c) instead, highlights the lack of non-linearity when gini gross is employed as an indicator for inequality. Indeed, only the linear term firmscred is positive and significant. Overall results seem to suggest that private credit to firms might be detrimental and then beneficial for equality.

The presence of non-linearity is also traced in regression (d), where a *U-shaped* pattern is depicted between the financial intermediation and *EHII* index, when data on private credit given to households are used as main regressors. The credit lent to the households seems to be mirroring the more general results (on aggregate level) displayed in Table 3: providing agents, in this case households, with financial resources is proequality up to a point, beyond which inequality starts increasing. The last regressions, (e) and (f), having the *gini net* and the *gini gross* respectively as dependent variables, do not show any evidence of non-linearity. Indeed, only the linear coefficient *household* is positive and significant at 1% level, suggesting that the private credit borrowed by households is harmful as it exacerbates inequality. Moreover, the different size of the linear terms *firms* and *households* in regression (c) and (f) are noteworthy. Provided that both are positive and significant, the impact in terms of size exerted on income inequality by the households' credit is bigger and inequality enhancing.

With respect to the control variables, signs are overall consistent among the three different measures of inequality. Inflation displays a positive sign, suggesting that a higher level of prices (and hence a higher cost of living) is associated to higher level of inequality. The government expenditure presents a negative and significant size, suggesting that it is spent efficiently and in a such a way that tends to reduce inequality. This results might be linked to the composition of the subsample in Table 4, as none of the low income and low-middle income countries are included due to the lack of data. Thus, the redistribution policies in more advanced economies can play a crucial role in assessing inequality and this might justify the negative sign of the variable *govgdp*. As far as the term of trade is concerned, a negative and significant coefficient result from all the regressions in Table 4: more opened economies tend to be associated with lower level of income inequality. As human capital proxy, the tertiary school enrollment is used (also due to the composition of subsample) and its coefficient is negative and significant, to confirm that education is a valid and a crucial tool to boost equality (also in terms of opportunity).

The third model specification (3) test respectively whether the level of economic development and the real structure of the economy affect the relationship between financial development (in its multiple dimensions) and income inequality. Table 5 shows the results when different measures of inequality are regressed on each dimension of FD, on control variables and on the interaction term with the logarithm of the GDP per capita (as proxy for the level of economic development). Overall it seems that, especially for the variables related to the banking structure and to the aggregate measure of financial intermediation (*privy*), the interaction term is positive and significant, suggesting that financial deepening and banking development are perhaps not bad by themselves. Although, this effect is mediated by the level of economic development, which results in exacerbating the level of income inequality. Instead, among the stock market structure, only the interaction term between *stockmktcap* and the economic development is positive but weakly significant. An opposite trend is depicted in the last result reported in Table 5, when the efficiency dimension is interacted with the *logGDPpc*. What it is confirmed is the positive effect exerted by the interest rate spread on inequality. However, the interaction term takes a negative value, suggesting that as an economy develops, the marginal effect of the spread on inequality is gradually decreasing (probably due to the lower level of this spread in more developed economies).

The second interaction term, included in the set of regression in Table 6, aims at investigating whether the real structure of an economy may impact on different financial structures and their consequent effect on income inequality.

Results are very strong and significant regardless the inequality measure chosen in the analysis: the banking variables have positive coefficients but their interaction terms with the industry value added (*indva*) are negative. In other words, for increasing level of value added in the industry sector, the effect exerted by banking structure on inequality is gradually decreasing. On the contrary, when the stock market variables are interacted with the value added in the service sector (*servva*), which includes also the financial services production, results differ among the various dependent variables: the interaction term is positive and significant, when *EHII* index is the proxy for inequality. Indeed, increasing level of production in service sector appear to exacerbate the level of inequality when stock markets are highly capitalized and of large dimensions. This can perhaps be attributed to different level of mobility across and within the sectors of production in the economy. Yet, with the *gini* indicator (both net and gross) this result is not confirmed and it becomes more inconclusive: neither the *stockmktcap* variable nor the interaction term are significant, while the interacted term with *totvaltraded* displays a negative coeffi-

*	EHII	ginii net	gini gross	EHII	gini net	gini gross
privy	-0.0598*	-0.151***	-0.119***			
	(0.0305)	(0.0299)	(0.0389)			
privy_2	0.000008	0.0000073^*	0.00008			
_	(0.0000)	(0.0000)	(0.0000)			
c.privy#c.logGDPpc	0.00652^{*}	0.0142***	0.0116***			
	(0.00348)	(0.00333)	(0.00432)			
spread				0.101	0.410^{***}	0.564^{***}
				(0.149)	(0.134)	(0.167)
c.spread#c.logGDPpc				-0.00916	-0.0441***	-0.0678***
				(0.0175)	(0.0163)	(0.0202)
Observations	873	1250	1250	699	980	980
N. countries	83	102	102	73	89	89
R-squared	0.306	0.246	0.367	0.31	0.291	0.424
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
	EHII	gini net	gini gross	EHII	gini net	gini gross
stockmktcap	0.00869	-0.0429*	0.000935			
	(0.0205)	(0.0248)	(0.0317)			
c.stockmktcap#c.logGDPpc	-0.00173	0.00486**	-0.00109			
	(0.00207)	(0.00243)	(0.0031)			
$tot_valtraded$				-0.047	-0.0236	-0.014
				(0.029)	(0.0244)	(0.0323)
$c.tot_valtraded#c.logGDPpc$				0.00383	0.00302	0.000474
				(0.00283)	(0.00234)	(0.0031)
Observations	752	866	1109	791	1129	1129
N countries	71	79	82	70	79	79
B-squared	0.37	0.219	0.417	0.379	0.175	0.394
Country FE	VES	VES	VES	VES	VES	VES
Vear FE	VES	VES	VES	VES	VES	VES
Controls	YES	YES	YES	YES	YES	YES
Controls	EHII	gini net	gini gross	EHII	gini net	gini gross
bankdepgdp	-0.0724**	-0.110***	-0.160***		giiii iiot	8 81.000
Samaopgap	(0.0324)	(0.0353)	(0.0451)			
c.bankdepgdp#c.logGDPpc	0.00801**	0.0115***	0.0181***			
onsermesber // onserer be	(0.00318)	(0.00338)	(0.0043)			
bankprivcredit	(0100010)	(0100000)	(0100-20)	-0.018	-0.142***	-0.0842**
				(0.0298)	(0.0286)	(0.0374)
c.bankprivcredit#c.logGDPpc				0.00188	0.0150***	0.00918**
sisampirereate# sitegeb1 pe				(0.0029)	(0.0027)	(0.0036)
				(0.0020)	(0.0021)	(0.0000)
Observations	844	1219	1219	869	1250	1250
N. countries	82	101	101	82	102	102
R-squared	0.307	0.219	0.361	0.298	0.354	0.354
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES

Table 5: Estimates from fixed effect panel estimation, model specification (3), interactions between economic development and finance

Standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1

	EHII	gini net	gini gross	EHII	gini net	gini gross
bankprivcredit	0.0294^{**}	0.0377^{***}	0.0721^{***}			
	(0.0122)	(0.0107)	(0.0137)			
c.bankprivcredit#c.indva	-0.000979**	-0.000907**	-0.00229***			
	(0.00039)	(0.00037)	(0.00047)			
bankdepgdp	. ,	. ,	. ,	0.0438^{***}	0.0328^{***}	0.0764^{***}
				(0.0109)	(0.0101)	(0.0127)
c.bankdepgdp#c.indva				-0.00172***	-0.00114***	-0.00255***
10 1//				(0.00038)	(0,0004)	(0,0005)
				(0.00000)	(0.0001)	(0.0000)
Observations	869	1250	1250	844	1219	1219
N. countries	82	102	102	82	101	101
R-squared	0.313	0.224	0.368	0.327	0.218	0.372
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
	EHII	gini net	gini gross	EHII	gini net	gini gross
stockmktcap	-0.0423***	0.0239	0.0258			
	(0.0144)	(0.0164)	(0.0217)			
c.stockmktcap#c.servva	0.000554^{**}	-0.000341	-0.000539			
	(0.00023)	(0.00025)	(0.00033)			
tot valtraded	× /	· /	· /	-0.0510***	0.0724^{***}	0.0541^{**}
—				(0.0197)	(0.0185)	(0.0244)
c.tot valtraded#c.servva				0.000661**	-0.000955***	-0.000932***
_ //				(0.000298)	(0.00027)	(0.000358)
				(0.000-000)	(0100021)	(0.000000)
Observations	752	1109	1109	791	1129	1129
N. countries	71	82	82	70	79	79
R-squared	0.382	0.195	0.426	0.385	0.184	0.405
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Stan	dard orrors i	n paronthoso	a *** n < 0.01	** >> < 0.05 *	n < 0.1	

Table 6: Estimates from fixed effect panel estimation, model speci.cation (3), interaction between financial and real structure.

Standard errors in parentheses $^{***}p{<}0.01,$ $^{**}p{<}0.05,$ $^*p{<}0.1$



Figure 10: Marginal effects of industry VA and banking structure on EHII index. Source: Author's elaboration based on SWIID, WDI and GFDD dataset

Figure 11: Marginal effects of service VA and stock market size on EHII index. Source: Author's elaboration based on SWIID, WDI and GFDD dataset

 $cient.^{41}$

Figure 10 and 11 show how the real structure and financial structure interact in affecting inequality (when EHII index is performed). In the left panel a decreasing marginal effect is depicted: for low levels of industry value added (or production) the effect exerted by banking sector on inequality is positive, but as the industrial production increases, the marginal effect tends to zero and eventually becomes negative. The opposite trend is found when the service value added is interacted with the stock market capitalization. For low and intermediate levels of service value added (about 63%), the effect of the size of financial stock markets on inequality is negative, but eventually it becomes positive, increasing the EHII at the margin.

4.2 Five year average GMM results.

The same analysis applies, for completeness, to data averaged over 5 years. This is not only to smooth out possible fluctuations but also to investigate the link between financial development and inequality in a longer run. Overall, the main results appear to be qualitatively similar to the annual analysis, suggesting the existence of a robust and lasting relationship between the multidimensions of financial development and income inequality. Hence, for the sake of brevity, only the main results will be reported and

⁴¹This results may be related to different ways to construct the inequality indicators, as the gini takes into account also pensions, agricultural wage and income from self-employment (with the latter perhaps more associated with the service sector and its value added).

briefly discussed, as there are no remarkable differences which appear to occur between the annual and the five year average analysis. Moreover, for each regression the standard test for the autocorrelation of residuals (Arellano-Bond) and the Sargan test for the goodness of model specification are run. In the first test, the null hypothesis is the lack II order autocorrelation in the residuals, whilst in the second one the goodness of instruments is under the null hypothesis.

Table 7 indeed reports the coefficients of the main financial variables in the model specification (1). All the set of regressions are run by including the main controls (*log-GDPpc*, ln_pop , govgdp, trade, infl, enroll_tert) and in some cases, lags of financial variables up to the third level which appear, sometimes, to fit better the dynamics of the relationship over time. One common result is the significance of the lagged dependent variable, to remark and confirm the presence of persistence of inequality and its dynamic nature. Banking indicators increase the level of inequality and results appear to be significant at 1% level. Stock market indicators display mixed results: their coefficients are always positive and significant when net gini is the proxy for inequality; the *EHII* and the gross gini tend to be negatively associated to the development of stock market (more precisely, this negative effect on inequality is always depicted with the latter indicator).⁴² As in the annual analysis, the spread indicator shows a positive and significant coefficient which reinforces the hypothesis that inefficient banking systems tend to exacerbate the level of inequality.

Table 8, instead, presents the results of the second model specification which aims at testing for the non-linearity. The negative linear term and the positive squared term seem to suggest, also with 5 year average data, the presence of a *U-shaped* pattern. Likewise, Table 9 tests the same hypothesis but using the disaggregated data on private credit in the small subsample of countries. In this case, due to the limitation of observations (as only 39 economies are available), it is better to run a more parsimonious model, by excluding the controls, in order to avoid the proliferation of instruments and get misleading results in the post-estimation test.

Results in this case slightly differ from the model with annual data: when the credit is lent to firms, a non-linearity and more precisely an inverted *U-shape* emerges most notably in the data when both net and gross gini are used to measure inequality (with annual data analysis only the linear term was significant) to suggest that low and middle level of credit increase inequality, while high levels of it tend to reduce it. However, when

 $^{^{42}}$ As robustness check we also regress turnover stock as proxy for the both the structure and the efficiency of stock markets and the coefficients are significant and dispaly a negative sign for both the *gross gini* and the *EHII* index.
	gini not	gini gross	FHI	gini not	gini gross	FHII
hanlmningandit	0.0267***	0.0157***	0.0127***	giin net	giiii gioss	
Dankpriveredit	(0.0307)	(0.0137)	(0.0137)			
bankdongdn	(0.00134)	(0.0023)	(0.0031)	0.0110***	0.0113***	0.0478***
bankdepgdp				(0.0110)	(0.0113)	(0.0473)
				(0.0020)	(0.0024)	(0.0045)
Observations	494	494	382	420	420	332
N. countries/lags	114/2	114/2	94/2	114/3	114/3	90/3
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.33	0.14	0.35	0.04	0.17	0.45
Autocorr test III	0.83	0.84	0.22	0.76	0.42	0.16
Sargan test	0.22	0.40	0.48	0.70	0.48	0.43
	gini net	gini gross	EHII	gini net	gini gross	EHII
stockmktcap	0.0185***	-0.00229	-0.0145***			
	(0.0019)	(0.00295)	(0.00158)			
$tot_valtraded$				0.0157^{***}	-0.00217***	0.00563^{***}
_				(0.00073)	(0.00073)	(0.00029)
Observations	328	328	211	331	331	218
N. countries/lags	86/1	86/1	72/1	87/1	87/1	74/1
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.141	0.6816	0.60	0.12	0.62	0.14
Autocorr test III	0.13	0.595	0.56	0.59	0.44	0.17
Sargan test	0.658	0.527	0.49	0.58	0.50	0.36
	gini net	gini gross	EHII	gini net	gini gross	EHII
turnover	0.00335^{*}	-0.00654***	-0.00283***			
	(0.00175)	(0.00216)	(0.0002)			
spread				0.0890^{**}	0.0384	0.169^{***}
				(0.0401)	(0.0477)	(0.0291)
Observations	377	377	212	338	338	225
N. countries/lags	87/1	87/1	73/1	104/1	104/1	80/1
Time span	, 60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.55	0.0227	0.26	0.20	0.61	0.075
Autocorr test III	0.584	0.705	0.22	0.36	0.58	0.322
Sargan test	0.325	0.451	0.36	0.69	0.20	0.438
	~					

Table 7: Model specification (1), 5 year average with GMM estimation.

	gini net	gini gross	EHII
L.y	0.528^{***}	0.505^{***}	0.808***
	(0.0031)	(0.0034)	(0.012)
privy	-0.0134***	-0.0432***	-0.0655***
	(0.00285)	(0.0015)	(0.0042)
privy 2	0.000112***	0.000197***	0.000315***
_	(0.000)	(0.000)	(0.000)
	. ,	. ,	. ,
Observations	495	495	406
N. countries/lags	119/1	119/1	95/1
Time span	60-14	60-14	63-08
Controls	YES	YES	YES
Autocorr test II	0.13	0.90	0.25
Autocorr test III	0.53	0.95	0.17
Sargan test	0.36	0.55	0.93

Table 8: Model specification (2), 5 year average with GMM specification.

the EHII index is used as a dependent variable, a U-shape is depicted in data.

Consistent results among the different proxy for inequality (also in line with the annual data estimates) occur when the private credit lent to households is tested. In this case a clear and significant *U-shape* is depicted: for low and intermediate levels of private credit the income inequality decreases, beyond which it starts increasing again. Eventually, Table 10 shows the model including the interaction between the different kind of financial structures and the real economy structures. Results are consistent with the annual data analysis: when the individual measure of inequality -that is *EHII*-is employed, a remarkable difference arises, such that for higher level of production in service sector and capitalization in the stock market, the exerted effect is positive, while the opposite holds when banking indicators are interacted with the value added in industry. When, instead, the gross and net gini are used, the effect of these interactions is always negative.⁴³

5 Robustness check

In order to test the robustness of the results, several checks have been implemented and the most relevant are reported in the Appendix, sub-section $5.^{44}$ The model has been

⁴³The interactions of the main financial variables with the level of GDP are not reported as qualitatively they do not differ in a remarkable way from the annual data specification. They are available upon request.

⁴⁴For the sake of brevity, the robustness checks not included in the Appendix are available upon request.

	$\operatorname{gini}\operatorname{net}$	gını gross	EHII
L.y	0.722^{***}	0.615^{***}	0.761^{***}
	(0.056)	(0.0186)	(0.0082)
householdcred	-0.0385***	-0.0232***	-0.0638***
	(0.0035)	(0.0078)	(0.0068)
household2	0.000277^{***}	0.000515^{***}	0.000637^{***}
	(0.000)	(0.000)	(0.000)
Constant	10.14^{***}	17.95^{***}	10.48^{***}
	(1.827)	(1.036)	(0.275)
Observations	208	208	162
N. countries	38	38	38
Controls	NO	NO	NO
Autocorr test II	0.02	0.08	0.16
Autocorr test III	0.63	0.37	0.53
Sargan test	0.95	0.98	0.90
	gini net	gini gross	EHII
L.y	0.00676	0.0459^{***}	-0.0170***
	(0.037)	(0.019)	(0.006)
firmscred	0.00676	0.0459^{***}	-0.0170***
	(0.005)	(0.005)	(0.0035)
firms2	-0.000018*	-0.00005**	0.00006***
	(0.0000)	(0.0000)	(0.0000)
Constant	10.47***	16.56***	6.309***
	(0.94)	(0.888)	(0.208)
Observations	205	205	159
N. countries	38	38	38
Controls	NO	NO	NO
Autocorr test II	0.027	0.071	0.253
Autocorr test III	0.8179	0.303	0.322
Sargan test	0.973	0.994	0.845
Standard errors	in parentheses.	*** p<0.01, ** p<0	0.05, * p<0.1

Table 9: Model specification (2) with disaggregated data, 5 year average GMM estimation

	gini net	gini gross	EHII	gini net	gini gross	EHII
bankdepgdp	0.0359^{***}	0.0257***	0.0582***			
	(0.0053)	(0.0054)	(0.0082)			
bankdepgdp#indva	-0.000739^{***}	-0.000574^{***}	-0.000882***			
	(0.0002)	(0.0001)	(0.0002)			
bankprivcredit				0.0381^{***} (0.0031)	0.0295^{***} (0.0028)	0.0257^{***} (0.0056)
bankprivcredit#indva				(0.000242^{***}) (0.0001)	-0.00116^{***} (0.0001)	-0.000296^{*} (0.00017)
Observations	420	420	332	471	471	382
N. countries/lags	114/3	114/3	90/3	118/2	118/2	94/2
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.05	0.18	0.49	0.39	0.28	0.34
Autocorr test III	0.69	0.37	0.24	0.79	0.49	0.25
Sargan test	0.61	0.41	0.40	0.51	0.49	0.43
	gini net	gini gross	EHII	gini net	gini gross	EHII
stockmktcap	0.280***	0.0134^{***}	-0.0798***			
	(0.0087)	(0.0051)	(0.01)			
stockmktcap#serva	-0.00395***	-0.000346***	0.00106^{***}			
	(0.0001)	(0.0000)	(0.000)			
tot_valtraded				0.0421***	0.0126	-0.116***
				(0.00548)	(0.00995)	(0.007)
$tot_valtraded #servva$				-0.000440***	-0.00019	0.00165^{***}
				(0.0001)	(0.00015)	(0.0001)
Observations	331	331	211	329	329	218
N. countries/lags	87/1	87/1	72/1	87/1	87/1	74/1
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.08	0.64	0.83	0.11	0.49	0.293
Autocorr test III	0.40	0.43	0.78	0.12	0.45	0.278
Sargan test	0.70	0.65	0.62	0.68	0.53	0.3921

Table 10: Model specification (3), 5 years average GMM estimation

estimated in logarithms to limit the possible presence of outliers and reduce possible scale bias; the model has also been estimated with random effects, as the Hausman test "do not clearly indicate that fixed effects need to be used" (De Haan and Sturm, 2017).; different control variables have been included, (such the government expenditure in education as alternative proxy for human capital; the broad money 'M3', also called liquid liabilities lly, as proxy for the size dimension of financial intermediation). With the aim to limit the potential endogeneity, the fixed effect model has been estimated by lagging the financial variables by one period. In addition, some outliers have been removed and regressions have been re-estimated. Results appear to be qualitatively robust. The model has also been estimated by shortening the time span, from 1970 onwards (to disregard the problem of missing value which makes the panel strongly unbalanced) but results are still confirmed. Last but not least, the analysis apply on subgroups of countries (OECD versus non-OECD) to analyse whether financial development exerts a different impact on countries which differ by their process of economic development.

6 Shortcoming and Discussion

Before concluding, we will briefly discuss the major points of this analysis and some limitations which should be pointed out. First, the *breadth* dimension (of financial accessibility) should be analysed as soon as more data will be released, in order to exploit also the time dimension other than the cross section one. Indeed, as pointed out by Honohan (2008), especially in low income economies, it is more relevant to measure how many barriers determine the 'financial exclusion', rather than focusing on the size of financial development, given the relevant share of population being credit constrained. This is a very important dimension that this work has not taken into account given the lack of panel data. Future works may shed light on financial accessibility and its link with inequality and poverty.

Our results on the financial structure partly confirm what has been previously found in Seven and Coskun (2016). They find a positive relationship between income inequality and banking intermediation, but no effect through stock market size. Our work, instead, points out that the direct effect of stock financial markets can reduce the level of inequality (perhaps agents face higher costs in the intermediation sector, given the asymmetric information and this might reflect the conditions of some agents to be more credit constrained than others in the banking sector). It is also possible that, as found in Kpodar, Singh (2011),more bank-based financial systems tend to permorf better at the bottom of the income distribution, mainly in developing countries, lifting people out of poverty. In this work, though, we did not analyze the link of financial systems on poverty, since it is not our main aim.

In regards of *depth* dimension, one of the possible reasons of the non-linearity depicted in the data (by using the variable *privy*) can perhaps be attributed to the different effects exerted by the 'risk sharing' and the 'risk taking' channels (Bonfiglioli, 2011). The first is associated to a decrease of income inequality, while the second is instead inequality enhancing. The U-shape relationship found in the model specification (2) might then be explained with the 'risk sharing' channel being stronger than the 'risk taking' one, up to a point where the level of inequality is minimum (for low and intermediate level of private credit). The opposite happens for higher and extreme levels of private credit: when the level of private debt is excessive, then, the 'risk taking' effect is stronger and would more than compensate the 'risk sharing' channel. The over exposition to debt and also speculation motive could harm especially the lower income groups, who can be eventually unable to repay their debts. This translates into a condition of being cut-off. In addition, it is also plausible that, for extreme levels of credit lent by financial institutions, only the ones already owning a large amount of (financial) resources can borrow them, since the risk of default is much lower in their case. These are, of course, just some of the potential reasons which might justify this pattern in the data, which is consistent with the result of Tan & Law (2014). This work is in line with the more recent works that have pointing out this new relationship. Unfortunately, we can not refer to any of the theoretical models previously mentioned, as none of them is able to predict this U-shaped pattern. In this way, the channels through which this relationship works remain partly uncovered. Perhaps not surprisingly, the relationship between inequality and finance can be also linked to the empirical findings found in Archand et al. (2015), dealing with economic growth and financial development. They depict an *inverse* Ushape, stressing how for low and intermediate levels of private credit, economic growth gradually increases, until it stops and starts decreasing for higher level of credit. By putting together these two results, it appears that private credit channel might be the connection link between (high) inequality and (low) economic growth and future research should be developed, aiming at reconciling these two empirical findings.

As far the disentangled credit given to household and borrowers, our results need to be interpreted with caution, as the sample is not largely representative (mostly advanced economies) and observations are not many, especially when we average data over 5 years. As new data will be available for a larger sample of countries, it could be interesting to re-estimate the model with the disaggregate private credit data from BIS, by including new countries and by extending the time span, also in order to avoid possible selection bias that might take place in this work. However, the main insight is that, while credit given to households is somehow inequality enhancing (at least for high levels of credit), the one lent by firms appears to be pro-equality, as more credit is available. These results are generally in line with Beck, Rioja, Valev (2012), even though they do not find any non-linear relationship and they restrict their analysis to the time span 1994-2005. The main reason why the type of borrower may matter in terms of inequality is, perhaps, to find in the spillover effects (in terms of higher employment and faster growth) that firms may create whenever they get financial resources to invest in profitable and innovative projects. It is also plausible to think that high levels of credit given to the non-financial firms are associated to risky but very profitable investments, which might even amplify the positive spillover effects, by affecting a large amount of agents. On the contrary, households tend to borrow to smooth consumption over time, to invest in education (when it is not free, especially at higher education levels) and in order to buy tangible assets, such as houses. Hence, their individual investment decisions might have no effect, or only marginal effects, on other individuals' life. This might be a (speculative) reasonable justification of the pattern depicted in the data.

Besides this, regarding the interaction model between financial and real structure of the economy, we further developed the hypothesis of Clarke, Xu, Zou (2002), since they interact the size of financial development on the sum of value added in both industry and service sector (called 'Modern'). One of the key mechanism, though, which might explain some results (dealing with the EHII index), stems from the close link existing between the financial stock market and the financial sector (which is included in the service sector). The marginal positive effect on inequality of the interaction term between stock capitalization and service production might be dragged by speculative motives, in terms of high rate of returns. Indeed, within the financial sector and among the financial professionals, there is a high concentration of top 1% income earners, who own a considerable proportion of financial wealth, in terms of stocks, options, financial derivatives (Bakija et al., 2012). This, for high level of production in service (and financial sector), amplifies the effect of the size of financial stock markets and it might exacerbate inequality, by boosting the income of top income earners. Hence, it is recommended in future studies to use the share of finance's value added and interact it with the stock market indicators (to better isolate the effect of financial production and not merely the value added of the whole service sector). When instead the size of banking intermediation is interacted with the industrial production, the effect on inequality is decreasing at the margin. One possible reason might be that when banking credit is channeled towards a large industrial sector, it can favor real production and boost growth, by creating some

spillover effects, in terms of employment, which can reduce inequality, by ameliorating the condition at the bottom/middle income distribution.

Last remark, the coefficient of *spread* is always positive and significant, as also found in Ang (2010), suggesting that setting rules aiming at regulating the competition in the banking system and limiting the monopolistic power of financial firms and banks may affect the income distribution (yet, no policy recommendations can be done if not supported by a theoretical model). This stresses the importance that financial reforms may exert in shaping income inequality and a deeper analysis, both empirically and theoretically, is recommended in the future. As pointed out by Kunt and Levine (2009) "economists underappreciate the potentially enormous impact of financial sector policies on inequality".

7 Conclusion

Lately, after the financial recession, the public has started paying considerable attention on the increasing level of inequality worldwide. Several factors might have contributed to exacerbate this phenomenon. However, this study focuses on the importance of one the possible determinants of inequality. Indeed, may financial development play a role in assessing this worrying pattern?. This work aims at studying, on a heterogenous sample of economies between 1960 and 2014, the relationship between income inequality, represented by the *EHII* index, the *net* and *gross gini* (from Solt, 2009) and some dimensions of financial development. It represents a too complex process to be reduced to only one aspect. More precisely, the main dimensions that have been tested are the *structure* (banking versus stock market indicators of size and liquidity), the *depth* dimension (or intensive margin), being the amount of credit lent to private sector, and the *efficiency* (measured by the *spread* between lending and deposit rate), as proxy for the degree of market imperfections. In addition, some other contributions have been brought to light in this analysis: i) the aggregate private credit (privy) has been disentangled according to the type of borrower, both households and firms, for a subsample of countries for which data from BIS were available, to isolate their effect on inequality and non-linearity has been tested; ii) given the close link between inequality, economic and financial development, the model has been estimated by also including an interaction term between each financial indicator and the level of GDP per capita; iii) last but not least, given the real structure of the economy and the structural transformation which has taken place, we test whether and to what extent real and financial structures interact to each other and how they affect the level of inequality. Indeed, we test if a difference occurs

between the case when stock market indicators are interacted with the share of service sector, and the second case, when banking system indicators are interacted with the share of industry value added. The intuition is based on the evidence that countries like USA or UK (displaying increasing level of inequality) are more service oriented, while economies like Germany, or Scandinavian countries are more industry based and with more developed banking systems.

The analysis has been carried out by implementing two different methodologies. In the first part, the fixed effect estimator has been applied on annual data, while in the second part, the GMM panel estimator (Blundell and Bond, 1998),on data averaged over 5 year intervals has been applied. In this way, we can smooth out possible fluctuations and also estimate the relationship over longer horizons. Three models have been tested, the linear, the non-linear (for the depth dimension) and the one with interactions. Overall, results seems to be confirmed (even tough sometimes remarkable differences among inequality measures arise, as expected). The main conclusions of this analysis highlight the differences between banking and stock market systems: banking indicators tend to be associated with higher level of inequality (results are consistent with annual and 5 year average data), whilst stock market indicators seems to be pro-equality (at least when the *EHII* index and the gross gini are used). When instead the net gini is used as the dependent variable, both the different financial structure configurations exacerbate the inequality (probably related to inefficient redistribution policies).

With respect to the *depth* dimension a U-shaped pattern has been depicted in the analysis. This result suggests that for low and intermediate level of private credit the inequality decreases until a certain level, beyond which it starts rising again, due to an excessive level of credit. The non-linearity has been confirmed also when data on private credit are disaggregated (even though the subsample is limited and results must be treated with caution). More precisely, when data are averaged over 5 years a U-shaped relationship is always found between all the measures of inequality and the household private credit. With annual data, instead, this non-linearity is found only with the EHII index, while a positive coefficient is depicted with the net and gross gini. Conclusions on the effect on inequality exerted by the firms' private credit are somehow mixed: with annual data and averaged data an inverse U-shaped trend has been depicted in most of the cases. As far as the efficiency dimension is concerned, higher levels of spread are proven to be associated with inequality, suggesting that whereas there are market imperfections and lack of banking competition, the level of inequality tends to be more remarked. The first interaction implemented in the model show that, ceteris paribus, for higher level of economic development, financial development tends to increase inequality

(which may also explains the recent trend in some advanced economies). The second interaction is also significant, but differences arise in terms of results, depending on the inequality proxy chosen. When the gini index (both net and gross) is the dependent variable, the coefficient of the interaction between the different financial structure (banking versus stock market system) and real structure (service versus industry) is always negative. Instead, when the *EHII* index is used as proxy for inequality, a remarkable difference emerges amongst them. Indeed, the interaction term for the co-joint effect of banking structure and the share of industry is negative, while the coefficient of stock market indicators interacted with the service value added appears to be always positive and significant.

In conclusion, a relationship between multiple dimensions of financial development and income inequality appears to exist. However, as financial development is a too complex phenomenon to be reduced and limited to only one aspect, different dominions of it have been studied and analysed. Financial development cannot be considered beneficial or harmful *in toto* for income inequality, but its effect is somewhat mixed and further studies on the topic are strongly encouraged with the aim to understand the main channels through which finance may affect the level of inequality.

References

- Acemoglu, D. (2008). "Introduction to modern economic growth". Princeton University Press.
- Aghion, P., & Bolton, P. (1992). "Distribution and growth in models of imperfect capital markets". European Economic Review, 36(2-3), 603-611.
- Aghion, P., & Bolton, P. (1997). "A theory of trickle-down growth and development". The Review of Economic Studies, 64(2), 151-172.
- Allen, F., & Gale, D. (1999). "Diversity of opinion and financing of new technologies". Journal of financial intermediation, 8(1-2), 68-89.
- Allen, F., & Gale, D. (2000). "Comparing financial systems". MIT press.
- Allen, F., Bartiloro, L., & Kowalewski, O. (2006). "Does economic structure determine financial structure?".
- Ang, J. B. (2010). "Finance and inequality: the case of India". Southern economic journal, 76(3), 738-761.
- Arcand, J. L., Berkes, E., & Panizza, U. (2015). "Too much finance?". Journal of Economic Growth, 20(2), 105-148.;
- Arellano, M., S. R. Bond (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations". Review of Economic Studies, 58 , 277–297.
- Arellano, M., O. Bover (1995). "Another Look at the Instrumental-Variable Estimation of Error-Components Models". Journal of Econometrics, 68, 29-52.
- Atkinson, T., Brandolini, A., & Smeeding, T. (2001). "Producing time series data for income distribution: sources, methods and techniques" (No. 295). LIS Working Paper Series.

Bakija, J., Cole, A., & Heim, B. T. (2012). "Jobs and income growth of top earners and the causes of changing i ncome inequality: Evidence from US tax return data". Unpublished manuscript, Williams College.

- Barro, R. J. (2000). "Inequality and Growth in a Panel of Countries". Journal of economic growth, 5(1), 5-32.
- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). "Finance, inequality and the poor". Journal of economic growth, 12(1), 27-49.

- Beck, T., Demirgüç-Kunt, A., & Levine, R. (2009). "Financial institutions and markets across countries and over time-data and analysis".
- Beck, T., Levine, R., & Levkov, A. (2010). "Big bad banks? The winners and losers from bank deregulation in the United States". The Journal of Finance, 65(5), 1637-1667.
- Beck, T., Büyükkarabacak, B., Rioja, F. K., & Valev, N. T. (2012). "Who gets the credit? And does it matter? Household vs. firm lending across countries". The BE Journal of Macroeconomics, 12(1).
- Banerjee, A. V., & Newman, A. F. (1993). "Occupational choice and the process of development". Journal of political economy, 101(2), 274-298.
- Bezemer, D., & Samarina, A. (2016). "Debt Shift, Financial Development and Income Inequality in Europe" (No. 16020-GEM). University of Groningen, Research Institute SOM (Systems, Organisations and Management).
- Blundell, R., S. R. Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models". Journal of Econometrics, 87, 115—143.
- Bonfiglioli, A. (2012). "Investor protection and income inequality: Risk sharing vs risk taking". Journal of development economics, 99(1), 92-104.
- Bound, J., Jaeger, D. A., & Baker, R. M. (1995). "Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak". Journal of the American statistical association, 90(430), 443-450.
- Bulíř, A. (2001). "Income inequality: does inflation matter?". IMF Staff papers, 48(1), 139-159.
- Bun, M. J., & Windmeijer, F. (2010). "The weak instrument problem of the system GMM estimator in dynamic panel data models". The Econometrics Journal, 13(1), 95-126.
- Bun, M. J., & Kiviet, J. F. (2003). "On the diminishing returns of higher-order terms in asymptotic expansions of bias". Economics Letters, 79(2), 145-152.
- Clarke, G. R., Xu, L. C., & Zou, H. F. (2006). "Finance and income inequality: what do the data tell us?". Southern economic journal, 578-596.
- De Haan, J., & Sturm, J. E. (2017). "Finance and income inequality: A review and new evidence". European Journal of Political Economy.
- Deininger, K., & Squire, L. (1996). "A new data set measuring income inequality". The World Bank Economic Review, 10(3), 565-591.

- Delis, M. D., Hasan, I., & Kazakis, P. (2013). "Bank regulations and income inequality: *Empirical evidence*". Review of Finance, 18(5), 1811-1846.
- Demirgüç-Kunt, A., & Levine, R. (2009). "Finance and inequality: Theory and evidence". Annu. Rev. Financ. Econ., 1(1), 287-318.

Denk, O., & Cazenave-Lacroutz, A. (2015). "Household finance and income inequality in the euro area." OECD Economic department working papers, n. 1266.

Diamond, P. A. (2016). "Addressing the forces driving inequality in the United States". Contemporary Economic Policy, 34(3), 403-411.

- Dow, J., & Gorton, G. (1997). "Stock market efficiency and economic efficiency: Is there a connection?". The Journal of Finance, 52(3), 1087-1129.
- Easterly, W. (2001). "The middle class consensus and economic development". Journal of economic growth, 6(4), 317-335.
- Epstein, G. A. (Ed.). (2005). "Financialization and the world economy". Edward Elgar Publishing.
- Fernández, A., & Tamayo, C. E. (2017). "From Institutions to Financial Development and Growth: What are the Links?". Journal of Economic Surveys, 31(1), 17-57.
- Galbraith, J. K. (2009). "Inequality, unemployment and growth: New measures for old controversies". Journal of Economic Inequality, 7(2), 189-206.
- Galor, O., & Moav, O. (2001). "Evolution and growth". European Economic Review, 45(4), 718-729.
- Galor, O., & Zeira, J. (1993). "Income distribution and macroeconomics". The review of economic studies, 60(1), 35-52.
- Gimet, C., & Lagoarde-Segot, T. (2011). "A closer look at financial development and income distribution". Journal of Banking & Finance, 35(7), 1698-1713.
- Giné, X., & Townsend, R. M. (2004). "Evaluation of financial liberalization: a general equilibrium model with constrained occupation choice". Journal of development Economics, 74(2), 269-307.
- Greenwood, J., & Jovanovic, B. (1990). "Financial development, growth, and the distribution of income". Journal of political Economy, 98(5, Part 1), 1076-1107.

- Hamori, S., & Hashiguchi, Y. (2012). "The effect of financial deepening on inequality: Some international evidence". Journal of Asian Economics, 23(4), 353-359.
- Honohan, P. (2008). "Cross-country variation in household access to financial services". Journal of Banking & Finance, 32(11), 2493-2500.
- Honohan, P. (2004). "Financial Development, Growth and Poverty: How Close are. Financial development and economic growth: Explaining the links",1.
- Huggett, M., Ventura, G., & Yaron, A. (2011). "Sources of lifetime inequality". The American Economic Review, 101(7), 2923-2954.
- Jauch, S., & Watzka, S. (2016). "Financial development and income inequality: a panel data approach". Empirical Economics, 51(1), 291-314.

Jaumotte, F., Lall, S., & Papageorgiou, C. (2013). *"Rising income inequality: technology, or trade and financial globalization?"*. IMF Economic Review, 61(2), 271-309.

Kaplan, S N and J Rauh (2010) "Wall Street and Main Street: What contributes to the rise in the highest incomes?", Review of Financial Studies, 23(3): 1004--1050.

Kappel, V. (2010). "The effects of financial development on income inequality and poverty".

- Kpodar, K., & Singh, R. J. (2011). "Does financial structure matter for poverty? evidence from developing countries".
- Kum, Hyunsub, (2008), "Inequality and its relationship with structural change", UNRISD Working paper
- Kuznets, S. (1955). "Economic growth and income inequality". The American economic review, 45(1), 1-28.
- Li, H., & Zou, H. F. (1998). "Income inequality is not harmful for growth: theory and evidence". Review of development economics, 2(3), 318-334.
- Mookherjee, D., & Ray, D. (2002). "Is equality stable?". The American Economic Review, 92(2), 253-259.
- Nikoloski, Z. (2013). "Financial sector development and inequality: is there a financial *Kuznets curve*?". Journal of International Development, 25(7), 897-911.
- OECD REPORT, 2016. "Income inequality update. Income inequality remains high in the face of weak recovery". <u>https://www.oecd.org/social/OECD2016-Income-Inequality-Update.pdf</u>

- Park, D., & Shin, K. (2017). "Economic Growth, Financial Development and Income Inequality". Emerging Markets Finance and Trade.
- Piketty, T. (1997). "The dynamics of the wealth distribution and the interest rate with credit rationing". The Review of Economic Studies, 64(2), 173-189.
- Piketty, T., & Saez, E. (2014). "Inequality in the long run". Science, 344(6186), 838-843.
- Rioja, F., & Valev, N. (2004). "Does one size fit all?: a reexamination of the finance and growth relationship". Journal of Development economics, 74(2), 429-447.
- Rioja, F., & Valev, N. (2004). "Finance and the sources of growth at various stages of economic development". Economic Inquiry, 42(1), 127-140.
- Roine, J., Vlachos, J., & Waldenström, D. (2009). "The long-run determinants of inequality: What can we learn from top income data?". Journal of Public Economics, 93(7), 974-988.
- Roodman, D. (2009). "A note on the theme of too many instruments". Oxford Bulletin of Economics and statistics, 71(1), 135-158.
- Ruud, P. A. (2000). "An introduction to classical econometric theory". OUP Catalogue.
- Seven, U., & Coskun, Y. (2016). "Does financial development reduce income inequality and poverty? Evidence from emerging countries". Emerging Markets Review, 26, 34-63.
- Solt, Frederick. (2009). "Standardizing the World Income Inequality Database." Social Science Quarterly 90(2):231–242.
- Stockhammer, E. (2015). "*Rising inequality as a cause of the present crisis*". Cambridge Journal of Economics, 39(3), 935-958.
- Tan, H. B., & Law, S. H. (2012). "Nonlinear dynamics of the finance-inequality nexus in developing countries". The Journal of Economic Inequality, 10(4), 551-563.
- University of Texas Inequality Project. 2013. "The UTIP-UNIDO Data Set." http://utip.gov.utexas.edu/data.html.
- Van Arnum, B. M., & Naples, M. I. (2013). "Financialization and income inequality in the United States, 1967–2010". American Journal of Economics and Sociology, 72(5), 1158-1182.

Appendix

Sub-section 1: List of countries are reported in the following tables.

			List of countries I		
1	Afghanistan	42	Georgia	83	Norway
2	Albania	43	Germany	84	Pakistan
3	Algeria	44	Ghana	85	Panama
4	Angola	45	Greece	86	Papua New Guinea
5	Argentina	46	Guatemala	87	Paraguay
6	Australia	47	Haiti	88	Peru
7	Austria	48	Honduras	89	Philippines
8	Azerbaijan	49	Hungary	90	Poland
9	Bangladesh	50	Iceland	91	Portugal
10	Barbados	51	India	92	Puerto Rico
11	Belgium	52	Indonesia	93	Romania
12	Belize	53	Ireland	94	Russian Federation
13	Benin	54	Israel	95	Rwanda
14	Bosnia and Herzegovina	55	Italy	96	Senegal
15	Botswana	56	Jamaica	97	Sevchelles
16	Brazil	57	Japan	98	Singapore
17	Bulgaria	58	Jordan	99	Slovenia
18	Burkina Faso	59	Kazakhstan	100	Somalia
19	Burundi	60	Kenya	101	South Africa
20	Cambodia	61	Kyrgyz Republic	102	Spain
21	Cameroon	62	Latvia	103	Sri Lanka
22	Canada	63	Lesotho	104	Sudan
23	Central African Republic	64	Liberia	105	Suriname
24	Chile	65	Lithuania	106	Swaziland
25	China	66	Luxembourg	107	Sweden
26	Colombia	67	Macedonia, FYR	108	Switzerland
27	Costa Rica	68	Madagascar	109	Tanzania
28	Croatia	69	Malawi	110	Thailand
29	Cuba	70	Malaysia	111	Togo
30	Cyprus	71	Malta	112	Trinidad and Tobago
31	Czech Republic	72	Mauritius	113	Tunisia
32	Denmark	73	Mexico	114	Turkey
33	Dominican Republic	74	Moldova	115	Uganda
34	Ecuador	75	Mongolia	116	Ukraine
35	El Salvador	76	Morocco	117	United Kingdom
36	Estonia	77	Mozambique	118	United States
37	Ethiopia	78	Nepal	119	Uruguay
38	Fiji	79	Netherlands	120	Zambia
39	Finland	80	New Zealand	121	Zimbabwe
40	France	81	Nicaragua		
41	Gabon	82	Nigeria		

The list of countries refer to the sample when EHII index is used as measure for income inequality.

			List of countries II				
1	Afghanistan	42	El Salvador	83	Maldives	124	St. Lucia
2	Albania	43	Estonia	84	Mali	125	St. Vincent-Grenadines
3	Algeria	44	Ethiopia	85	Malta	126	Sudan
4	Angola	45	Fiji	86	Mauritania	127	Suriname
5	Argentina	46	Finland	87	Mauritius	128	Swaziland
6	Australia	47	France	88	Mexico	129	Sweden
7	Austria	48	Gabon	89	Moldova	130	Switzerland
8	Azerbaijan	49	Georgia	90	Mongolia	131	Tajikistan
9	Bangladesh	50	Germany	91	Montenegro	132	Tanzania
10	Barbados	51	Ghana	92	Morocco	133	Thailand
11	Belarus	52	Greece	93	Mozambique	134	Timor-Leste
12	Belgium	53	Grenada	94	Namibia	135	Togo
13	Belize	54	Guatemala	95	Nepal	136	Trinidad and Tobago
14	Benin	55	Guinea	96	Netherlands	137	Tunisia
15	Bhutan	56	Guinea-Bissau	97	New Zealand	138	Turkey
16	Bolivia	57	Guyana	98	Nicaragua	139	Turkmenistan
17	Bosnia-Herzegovina	58	Haiti	99	Niger	140	Uganda
18	Botswana	59	Honduras	100	Nigeria	141	Ukraine
19	Brazil	60	Hungary	101	Norway	142	United Kingdom
20	Bulgaria	61	Iceland	102	Pakistan	143	United States
21	Burkina Faso	62	India	103	Panama	144	Uruguay
22	Burundi	63	Indonesia	104	Papua N. Guinea	145	Uzbekistan
23	Cambodia	64	Ireland	105	Paraguay	146	Vietnam
24	Cameroon	65	Israel	106	Peru	147	West Bank and Gaza
25	Canada	66	Italy	107	Philippines	148	Yemen, Rep.
26	Central African Rep.	67	Jamaica	108	Poland	149	Zambia
27	Chad	68	Japan	109	Portugal	150	Zimbabwe
28	Chile	69	Jordan	110	Puerto Rico		
29	China	70	Kazakhstan	111	Romania		
30	Colombia	71	Kenya	112	Russian Federat.		
31	Comoros	72	Kyrgyz Rep	113	Rwanda		
32	Costa Rica	73	Latvia	114	Senegal		
33	Croatia	74	Lebanon	115	Serbia		
34	Cuba	75	Lesotho	116	Seychelles		
35	Cyprus	76	Liberia	117	Sierra Leone		
36	Czech Republic	77	Lithuania	118	Singapore		
37	Denmark	78	Luxembourg	119	Slovenia		
38	Djibouti	79	Macedonia, FYR	120	Somalia		
39	Dominica	80	Madagascar	121	South Africa		
40	Dominican Republic	81	Malawi	122	Spain		
41	Ecuador	82	Malaysia	123	Sri Lanka		

The list of countries refer to the sample when gross and gini net index are used as measure for income inequality (from SWIID dataset). However not all of them are included in the analysis, as data from GFDD might be missing for some countries.



Sub-section 2: Additional descriptive graphs and statistics.

Figure 12: 3D Scatter plot (elaborated in Matlab) which display the relationship among three variables: financial deepening (privy), economic development (logGDP_pc) and inequality (using gross_gini variable). Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.



Figure 13: 2D Scatter plot between the gini gross (or gini_market) and the privy. Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.



Figure 14: Marginal effects of the disentangled credit on inequality, measured by EHII index. Source: Author's elaboration based on final dataset combining SWIID, WDI and BIS dataset.

Variables		Definition	Sources
gini_net	Inequality	Net level of the gini index of inequality.	SWIID
gini_gross	Inequality	Gross level of the gini index of inequality.	SWIID
EHII	Inequality	Estimated Housohold Income Inequality	UTIP_UNIDO
bankdepgdp	Structure	Bank deposits to GDP (%). The total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	GFDD
bankprivcredit	Structure	The financial resources provided to the private sector by domestic money banks as a share of GDP.	GFDD
stockmktcap	Structure	Stock market capitalization to GDP (%). Total value of all listed shares in a stock market as a percentage of GDP.	GFDD
tot_valtraded	Structure	Stock market total value traded to GDP (%).Total value of all traded shares in a stock market exchange as a percentage of GDP.	GFDD
privy	Depth	Private credit divided by GDP; claims on the private sector by deposit money banks and other financial institutions	GFDD
lly	Depth	Liquid liabilities to GDP (%). Liquid liabilities are also known as broad money, or M3.	GFDD
spread	Efficiency	Bank lending-deposit spread. Difference between lending rate and deposit rate. Lending rate is the rate charged by banks on loans to the private sector and deposit interest rate is the rate offered by commercial banks on three-month deposits.	GFDD
turnover	Efficiency/ Structure	Stock market turnover ratio (%). Total value of shares traded during the period divided by the average market capitalization for the period.	GFDD
firmscred	Depth	Share of private credit lent to firms.	BIS
householdcred	Depth	Share of private credit lent to households.	BIS

Overview of main variables and sources

Notes: the table refers to the main variables and also those ones used for the robustness check.

	Correlation matrix									
	bankpriveredit	privy	stockmktcap	totvaltraded	spread	turnover	bankdepgdp	EHII		
bankprivcredit	1									
privy	0.92	1								
stockmktcap	0.43	0.53	1							
totvaltraded	0.41	0.51	0.78	1						
spread	-0.47	-0.46	-0.22	-0.268	1					
turnover	0.24	0.33	0.32	0.707	-0.2	1				
bankdepgdp	0.80	0.84	0.48	0.517	-0.3	0.34	1			
EHII	-0.48	-0.36	-0.02	-0.124	0.51	-0.21	-0.26	1		

Overview of control variables and sources								
Variable	Variable Definition							
logGDPpc	Natural logarithm of Real per capita GDP in Constant country groups based on four income categories (high, middle, lower middle and low income)	WDI						
infl	Annual growth rate of deflator; log(1+defl/100)	WDI						
agrva	Value added by the agricultural sector as a share of GDP	WDI						
indva	Value added by the industry sector as a share of GDP	WDI						
servva	Value added by the service sector as a share of GDP	WDI						
govgdp	Government consumption Government share of expenditure	WDI						
enroll_secondary	school enrollment, secondary (%gross)	WDI						
enroll_tert	school enrollment, tertiary (%gross)	WDI						
ruraltot	share of pop. living in rural area	WDI						
unempl	share of unemployment	WDI						
trade	Sum of export and import (%GDP)	WDI						
ln_pop	Natural logarithm of population	Penn World Table						

	Correlation matrix									
	bankprivcredit	privy	stockmktcap	totvaltraded	spread	turnover	bankdepgdp	EHII		
bankprivcredit	1									
privy	0.92	1								
stockmktcap	0.43	0.53	1							
totvaltraded	0.41	0.51	0.78	1						
spread	-0.47	-0.46	-0.22	-0.268	1					
turnover	0.24	0.33	0.32	0.707	-0.2	1				
bankdepgdp	0.80	0.84	0.48	0.517	-0.3	0.34	1			
EHII	-0.48	-0.36	-0.02	-0.124	0.51	-0.21	-0.26	1		



Figure 15: Marginal effects of the (aggregate) private credit on inequality, measured by the net and groos (or market) Gini. Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.

Interestingly, when the gini_net is used, its marginal effect is negative up to a level of private credit of about 150% over the GDP; and only after that threshold it starts affecting positively the level of inequality. When the gini_gross is used, the threshold beyond which financial intermediation starts widening inequality is much lower than the previous case, about 65% as share of GDP.

Descriptive statistics									
Variable	Obs	Mean	Std. Dev.	Min	Max				
educ_governm	2466	4.51	1.99	0	44.33				
enroll_secondary	4004	65.43	34.17	1.28	164.81				
enroll_tert	3768	24.62	23.16	0	119.78				
ruraltot	6656	50.73	24.41	0	97.92				
logGDPpc	6608	8.09	1.50	4.74	11.60				
govgdp	5387	15.44	5.93	2.05	63.94				
indva	4369	29.16	11.67	2.53	96.74				
indva_growth	4152	4.06	8.93	-73.66	123.73				
manufva	4123	16.04	7.35	0.8	47.34				
manufvagrowth	3885	3.93	8.69	-54.01	97.71				
servva	4372	52.20	14.07	2.43	87.99				
servva_growth	4134	4.32	7.18	-57.12	215.97				
agrva	4395	18.72	16.23	0.04	94.85				
agrvagrowth	4223	2.52	9.27	-45.95	78.01				
empl_agr	2379	17.90	17.54	0.1	92.2				
empl_ind	2411	24.79	7.51	2.2	46.9				
empl_serv	2411	56.32	15.53	5.6	85.7				
unempl	2467	8.81	5.64	0	39.3				
trade	5476	72.14	49.42	4.92	439.66				
infl	6471	1.34	3.64	0.723	155.44				
totvaltraded	609	43.50	23.49	0.34	99.82				
bank_privatecred	5290	36.82	34.66	0.36	262.46				
lly	5207	45.94	37.56	4.59	399.11				
privy	5303	39.36	37.55	0.36	262.46				
stockmktcap	2205	46.16	57.00	0.01	996.94				
tot_valtraded	2294	20.30	36.87	0	313.59				
spread	2703	7.85	7.800	0.2	91.76				
turnover	2166	43.62	73.40	0.01	1732.29				
bankdep_gdp	5252	38.15	36.73	0.75	479.67				
gini net	3591	36.74	9.62	14.76	67.21				
gini gross	3591	45.52	8.12	18.52	76.88				
EHII	3217	41.62	7.09	20.57	59.95				

The table includes also some control variables used to perform the robustness check

(some variables includes outliers which have been removed when analysis has been performed).

Sub-section 3:	Completed	tables of regi	ression anal	ysis (Fixed	effects)).
	1				<u></u>	,	

			2008).			
	EHII	EHII	EHII	EHII	EHII	EHII
	<i>(a)</i>	<i>(b)</i>	<i>(c)</i>	<i>(d)</i>	(e)	(f)
logGDPpc	-0.738	-4.020***	-3.923***	-1.852***	-4.770***	-4.889***
	(0.666)	(0.807)	(0.79)	(0.642)	(0.701)	(0.824)
govgdp	-0.0855**	0.0068	-0.0207	-0.00873	-0.0519	-0.0458
	(0.0379)	(0.0342)	(0.0343)	(0.0318)	(0.0331)	(0.0354)
agrva	0.163***	0.179***	0.172***	0.200***	0.237***	0.141***
	(0.0382)	(0.0386)	(0.0367)	(0.0328)	(0.0337)	(0.0376)
trade	-0.0207***	-0.00602	-0.00544	-0.0123**	-0.00919*	-0.0079
	(0.00619)	(0.00473)	(0.00471)	(0.00484)	(0.00471)	(0.00486)
infl	-0.0235***	-0.000625	-0.00105*	-0.00105	-0.00106*	-0.00106*
	(0.00717)	(0.000666)	(0.000566)	(0.000646)	(0.000624)	(0.000571)
enrollsecondary	-0.0211**	-0.0129*	-0.0132*	-0.00805	-0.0164**	-0.00863
	(0.00963)	(0.00729)	(0.00723)	(0.00797)	(0.00734)	(0.00866)
unempl	0.148***	0.0843***	0.0887***	0.116***	0.0827***	0.0843***
	(0.0266)	(0.0239)	(0.0236)	(0.024)	(0.0233)	(0.0243)
ruraltot	-0.0989***	-0.0152	-0.0179	-0.0365	-0.0474	-0.0216
	(0.0336)	(0.0329)	(0.0327)	(0.0309)	(0.0328)	(0.0336)
ln_pop	-5.336***	-5.265***	-5.629***	-4.768***	-4.491***	-6.951***
	(1.489)	(1.446)	(1.419)	(1.183)	(1.276)	(1.467)
Constant	62.17***	86.53***	87.07***	65.85***	92.85***	98.58***
	(8.779)	(9.684)	(9.34)	(7.921)	(8.491)	(9.698)
spread	0.034**					
	(0.0136)					
bankdepgdp		0.0124**				0.0237***
		(0.00572)				(0.00542)
stockmktcap			-0.0062**			-0.0051**
-			(0.00243)			(0.00253)
tot_valtraded					-0.0093***	
—					(0.00272)	
bankprivcredit				-0.00183		
-				(0.00363)		
Observations	712	881	780	906	819	742
N. countries	77	85	73	86	73	72
R-squared	0.304	0.298	0.357	0.293	0.381	0.374
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Table 10. Results from fixed effect panel estimation, specification (1), with EHII index as independent variable (1960-

Notes: EHII: income inequality proxy (from UTIP_UNIDO); bankdepgdp: bank deposit to GDP (%); stockmktcap: stock market capitalization to GDP (%); tot_valtraded: stock market total value traded to GDP (%); bankprivcredit: private credit lent by banks as a %(GDP); spread: bank lending-deposit spread; logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrollsecondary: school enrollment, secondary (%gross); unempl: % of unemployment; ruraltot: % of pop. living in rural area; ln_pop: natural log of population.

	gini net	gini net	gini net	gini net	gini net
	(a)	<i>(b)</i>	(c)	(d)	(e)
logGDPpc	5.677***	2.802***	4.264***	3.974***	3.988***
	(0.732)	(0.68)	(0.657)	(0.721)	(0.642)
govgdp	-0.045	-0.0656*	-0.030	-0.026	-0.035
	(0.0432)	(0.0382)	(0.0377)	(0.0392)	(0.0367)
agrva	0.006	0.0897***	0.0721**	0.0749**	0.0757**
	(0.0354)	(0.0332)	(0.0316)	(0.0354)	(0.031)
trade	-0.002	-0.005	0.000	-0.003	0.001
	(0.00631)	(0.00471)	(0.00507)	(0.00478)	(0.00489)
infl	-0.086	0.007	0.112	0.110	0.104
	(0.845)	(0.084)	(0.0699)	(0.0774)	(0.0687)
enrollsecondary	-0.005	-0.0125*	-0.0214**	-0.0126*	-0.0188**
	(0.00951)	(0.00752)	(0.00856)	(0.0074)	(0.0078)
unempl	0.201***	0.186***	0.172***	0.164***	0.174***
	(0.0308)	(0.0259)	(0.0269)	(0.0262)	(0.0263)
ruraltot	-0.21***	-0.029	-0.125***	-0.021	-0.140***
	(0.0331)	(0.0297)	(0.0289)	(0.0295)	(0.0287)
lnpop	-4.71***	-5.194***	-4.213***	-5.303***	-4.077***
	(1.492)	(1.324)	(1.244)	(1.437)	(1.214)
Constant	3.733	20.94**	10.440	8.929	12.600
	(9.436)	(8.294)	(8.062)	(9.008)	(7.92)
spread	0.046***				
	(0.015)				
tot valtraded		0.00626**			
_		(0.00255)			
bankdepgdp			0.005		
			(0.00571)		
stockmktcap				-0.001	
Ĩ				(0.0028)	
bankpriveredit				. ,	0.0127***
1					(0.0032)
					. ,
Observations	1,029	1,186	1,292	1,160	1,323
N. countries	89	81	103	81	104
R-squared	0.323	0.163	0.208	0.167	0.218
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Table 11. Results from fixed effect panel estimation, specification (1), with gini net as independent variable (1960-2014).

Notes: gini_net: income inequality proxy (from Solt, 2009); bankdepgdp: bank deposit to GDP (%); stockmktcap: stock market capitalization to GDP (%); tot_valtraded: stock market total value traded to GDP (%); bankprivcredit: private credit lent by banks as a %(GDP); spread: bank lending-deposit spread; logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrollsecondary: school enrollment, secondary (%gross); unempl: % of unemployment; ruraltot: % of pop. living in rural area; ln_pop: natural log of population.

Table	12.	Results	from	fixed	effect	panel	estimation,	specification	(1),	with	gini	gross	being	the	independent	variable,
(1960-	201	4).														

	gini gross				
	<i>(a)</i>	<i>(b)</i>	(c)	(d)	(e)
logGDPpc	6.975***	4.571***	5.424***	6.446***	5.20***
	(0.889)	(0.875)	(0.818)	(0.929)	(0.808)
govgdp	-0.028	-0.0827*	-0.045	-0.05	-0.06
	(0.0524)	(0.0491)	(0.0469)	(0.0505)	(0.0462)
agrva	0.063	0.0955**	0.0837**	0.0886*	0.0806**
	(0.043)	(0.0427)	(0.0393)	(0.0457)	(0.039)
trade	-0.019**	-0.005	-0.0139**	-0.016***	-0.0103*
	(0.0077)	(0.0061)	(0.006)	(0.0061)	(0.006)
Infl	1.812*	0.212*	0.190**	0.217**	0.181**
	(1.03)	(0.108)	(0.087)	(0.099)	(0.086)
enrollsecondary	-0.006	-0.0171*	-0.033***	-0.01	-0.0214**
	(0.012)	(0.01)	(0.011)	(0.01)	(0.01)
unempl	0.360***	0.409***	0.368***	0.399***	0.387***
	(0.037)	(0.033)	(0.033)	(0.034)	(0.034)
ruraltot	-0.0748*	0.029	-0.047	0.0775**	-0.05
	(0.040)	(0.038)	(0.036)	(0.038)	(0.040)
ln_pop	-15.6***	-19.69***	-14.50***	-18.84***	-14.68***
	(1.811)	(1.703)	(1.548)	(1.852)	(1.528)
Constant	17.270	46.81***	29.38***	25.06**	31.51***
	(11.46)	(10.7)	(10.04)	(11.6)	(9.97)
spread	-0.007				
	(0.018)				
totvaltraded		-0.0098***			
		(0.0033)			
bankdepgdp			0.0190***		
			(0.007)		
stockmktcap				-0.011***	
				(0.0035)	
bankprivcredit					0.0111***
					(0.004)
Observations	1,029	1,186	1,292	1,160	1,323
N. countries	89	81	103	81	104
R-squared	0.422	0.379	0.348	0.401	0.349
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Notes: gini_gross: income inequality proxy (from Solt, 2009); bankdepgdp: bank deposit to GDP (%); stockmktcap: stock market capitalization to GDP (%); tot_valtraded: stock market total value traded to GDP (%); bankprivcredit: private credit lent by banks as a %(GDP); spread: bank lending-deposit spread; logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrollsecondary: school enrollment, secondary (%gross); unempl: % of unemployment; ruraltot: % of pop. living in rural area; ln_pop: natural log of population.

	(a)	<i>(b)</i>	(c)	(d)
	EHII	EHII	EHII	EHII
ln_pop	-3.093**	-2.608**	-5.241***	-3.032**
	(1.225)	(1.298)	(1.365)	(1.297)
log_GDP_pc	-0.696	-0.82	-2.824***	-4.271***
	(0.68)	(0.674)	(0.892)	(0.758)
govgdp	-0.044	-0.0622*	-0.0746**	-0.103***
	(0.032)	(0.032)	(0.0328)	(0.033)
agrva	0.183***	0.156***	0.133***	0.215***
	(0.0391)	(0.0393)	(0.0441)	(0.0404)
trade	-0.00719	-0.0105**	-0.00531	-0.0110**
	(0.005)	(0.0052)	(0.0048)	(0.005)
infl	-0.301***	-0.322***	-0.227**	-0.269**
	(0.111)	(0.111)	(0.0982)	(0.133)
enroll_tert	-0.0182**	-0.0119	-0.0218***	-0.00756
	(0.0091)	(0.00912)	(0.0082)	(0.0084)
unempl	0.120***	0.120***	0.0954***	0.0974***
	(0.0238)	(0.0239)	(0.0232)	(0.024)
indva	-0.026	0.0127		
	(0.0294)	(0.0293)		
servva			0.0333	0.0293
			(0.0234)	(0.0227)
Constant	51.43***	51.29***	74.25***	81.61***
	(7.95)	(7.86)	(9.975)	(8.944)
bank_privcredit	0.0294**			
	(0.012)			
c.bank_privcredit#c.indva	-0.000979**			
	(0.0004)			
bankdep_gdp		0.0438***		
		(0.0109)		
c.bankdep_gdp#c.indva		-0.00172***		
		(0.00038)		
stockmktcap			-0.0423***	
			(0.0144)	
c.stockmktcap#c.servva			0.000554**	
			(0.00023)	
tot_valtraded				-0.0510***
				(0.0197)
c.tot_valtraded#c.servva				0.000661**
				(0.0003)
Observations	869	844	752	791
N. of countries	82	82	71	70
R-squared	0.313	0.327	0.382	0.385
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES

Table 13. Estimates from fixed effect panel estimation, model specification (3).

	<i>(a)</i>	<i>(b)</i>	(c)	(d)
	gini net	gini net	gini net	gini net
ln_pop	-2.510*	-2.454*	-5.262***	-6.197***
	(1.284)	(1.325)	(1.405)	(1.342)
log_GDP_pc	5.412***	5.337***	4.476***	2.334***
	(0.67)	(0.662)	(0.742)	(0.732)
govgdp	0.0266	0.0258	0.0157	-0.0366
	(0.038)	(0.038)	(0.039)	(0.0387)
agrva	0.0721**	0.0528	0.110***	0.136***
C	(0.0349)	(0.0354)	(0.0424)	(0.0394)
trade	0.00889*	0.00584	0.00226	0.00044
	(0.0052)	(0.0054)	(0.0049)	(0.0048)
infl	0.236**	0.239**	0.354***	0.136
	(0.0933)	(0.0947)	(0.136)	(0.179)
enroll tert	-0.0184*	-0.00763	-0.00892	-0.0106
—	(0.0099)	(0.0101)	(0.0091)	(0.00907)
unempl	0.127***	0.120***	0.129***	0.140***
	(0.026)	(0.0265)	(0.0254)	(0.0256)
indva	0.0512*	0.0535*		
	(0.0311)	(0.0312)		
servva	× ,	× ,	0.0401	0.0432*
			(0.0267)	(0.0245)
Constant	-13.50*	-12.15	-1.404	
	(7.821)	(7.7)	(8.706)	
bank privcredit	0.0377***	()		
<u> </u>	(0.0107)			
c.bank privcredit#c.indva	-0.00091**			
	(0.00037)			
bankdep gdp	()	0.0328***		
		(0.0101)		
c.bankdep_gdp#c.indva		-0.0011***		
		(0.00037)		
stockmktcap		(0.0239	
F			(0.0164)	
c stockmktcan#c servva			-0.000341	
•			(0.00025)	
tot valtraded			(0.00020)	0 0724***
				(0.0185)
c tot_valtraded#c servva				-0.00095***
				(0.00027)
				(0.00027)
Observations	1.250	1.219	1.109	1.129
N of countries	102	101	82	79
R-squared	0.224	0.218	0.195	0.184
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES

Table 14. Estimates from fixed effect panel estimation, model specification (3).

	<i>(a)</i>	<i>(b)</i>	(c)	(d)
	gini gross	gini gross	gini gross	gini gross
ln_pop	-11.37***	-11.19***	-17.48***	-19.75***
	(1.644)	(1.677)	(1.867)	(1.77)
log_GDP_pc	6.754***	6.300***	6.114***	3.515***
	(0.857)	(0.837)	(0.986)	(0.965)
govgdp	-0.0484	-0.0393	-0.0622	-0.0998*
	(0.0482)	(0.0485)	(0.0521)	(0.0511)
agrva	0.018	0.00575	0.198***	0.202***
	(0.0446)	(0.0447)	(0.0563)	(0.052)
trade	-0.000555	-0.00848	-0.00924	-0.0124*
	(0.0067)	(0.007)	(0.0066)	(0.0064)
infl	0.189	0.199*	0.181	0.292
	(0.119)	(0.12)	(0.181)	(0.236)
enroll_tert	0.0178	0.0296**	0.0145	0.0128
	(0.0127)	(0.0127)	(0.012)	(0.012)
unempl	0.307***	0.280***	0.334***	0.335***
	(0.0332)	(0.0335)	(0.0337)	(0.0338)
indva	0.0173	0.0272		
	(0.0398)	(0.0395)		
servva			0.136***	0.129***
			(0.0355)	(0.0323)
Constant	7.094	10.92	17.5	47.56***
	(10.01)	(9.742)	(11.57)	(11.1)
bank_privcredit	0.0721***			
	(0.0137)			
c.bank_privcredit#c.indva	-0.00229***			
	(0.00047)			
bankdep_gdp		0.0764***		
		(0.0127)		
c.bankdep_gdp#c.indva		-0.0026***		
		(0.0005)		
stockmktcap			0.0258	
			(0.0217)	
c.stockmktcap#c.servva			-0.00053	
			(0.00032)	
tot_valtraded				0.0541**
				(0.0244)
c.tot_valtraded#c.servva				-0.0009***
				(0.00035)
Observations	1,250	1,219	1,109	1,129
Number of country	102	101	82	79
R-squared	0.368	0.372	0.426	0.405
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES

Table 15. Estimates from fixed effect panel estimation, model specification (3).

	aini nat	aini aross	FHII	gini net	gini gross	FHII
LV			0.007***		Sun Sins	0.704***
L.Y	0.550***	0.541***	0.807***	0.424***	0.607***	0./04***
1 1 1 11	(0.0087)	(0.009)	(0.018)	(0.013)	(0.019)	(0.035)
bank_priveredit	0.0367***	0.015/***	0.0137***			
	(0.0013)	(0.0023)	(0.0031)	0.0110111		
bankdep_gdp				0.0110***	0.0113***	0.0478***
				(0.003)	(0.002)	(0.0045)
logGDP_pc	-2.580***	-1.012***	-1.115***	-2.478***	0.264	-1.987***
	(0.133)	(0.141)	(0.178)	(0.322)	(0.202)	(0.222)
ln_pop	0.969***	-0.810***	1.614***	1.295***	-0.11	1.292***
	(0.116)	(0.124)	(0.201)	(0.155)	(0.141)	(0.258)
enroll_tert	0.0119***	0.0362***	-0.00807*	0.0203***	0.0343***	0.0305***
	(0.0031)	(0.0035)	(0.005)	(0.004)	(0.006)	(0.007)
govgdp	-0.0820***	0.137***	0.0421**	-0.0337*	0.123***	0.0418**
	(0.0152)	(0.016)	(0.0197)	(0.018)	(0.028)	(0.021)
trade	-0.0244***	-0.0337***	-0.0191***	-0.0216***	-0.0286***	-0.017***
	(0.0018)	(0.002)	(0.0026)	(0.0026)	(0.0041)	(0.0021)
infl	-0.363***	-0.201***	-0.0799	-0.259***	-0.173***	0.253***
	(0.0151)	(0.025)	(0.055)	(0.0081)	(0.036)	(0.076)
agrva			-0.00998	-0.0578**	0.00967	-0.071***
			(0.0088)	(0.023)	(0.028)	(0.0127)
Constant	37.67***	29.66***	14.22***	41.11***	14.99***	26.64***
	-1.72	-1.019	-1.966	(3.234)	(2.627)	(2.145)
Observations	494	494	382	420	420	332
N. countries/lags	114/2	114/2	94/2	114/3	114/3	90/3
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.33	0.14	0.35	0.04	0.17	0.45
Autocorr test III	0.83	0.84	0.22	0.76	0.42	0.16
Sargan test	0.22	0.40	0.48	0.70	0.48	0.43

Sub-section 4: Completed tables of regression analysis (GMM analysis).

Table 16. GMM model specification (1), 5 year average.

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index.

Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; bankdepgdp: bank deposit to GDP (%); bankprivcredit: private credit lent by banks as a %(GDP); logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrol_etr: school enrollment, tertiary (%gross); ln_pop: natural log of population.

Table 17. GMM model specification (1), 5 year average.

	gini net	gini gross	EHII	gini net	gini gross	EHII
L.y	0.580***	0.309***	0.720***	0.601***	0.264***	0.703***
	(0.0292)	(0.0191)	(0.0174)	(0.01)	(0.005)	(0.010)
stockmktcap	0.0185***	-0.00229	-0.0145***	0.0157***	-0.0021***	0.00563***
	(0.0019)	(0.0029)	(0.0016)	(0.0007)	(0.001)	(0.0003)
tot_valtraded				-0.007***	-0.0049***	0.00364***
				(0.0004)	(0.0011)	(0.0007)
logGDP_pc	-2.780***	-0.889***	-1.026***	-2.208***	-0.589***	-1.354***
	(0.365)	(0.154)	(0.257)	(0.113)	(0.0995)	(0.15)
ln_pop	0.652***	0.632***	-0.00396	0.187	-0.665***	-0.0977
	(0.181)	(0.164)	(0.121)	(0.141)	(0.108)	(0.0823)
enroll_tert	-0.0107*	0.0368***	0.00855***	-0.0138***	0.0492***	0.00216
	(0.0056)	(0.0048)	(0.0031)	(0.0048)	(0.0027)	(0.0028)
govgdp	0.0425***	0.0654**	0.0141	0.0233*	0.198***	0.0280*
	(0.0145)	(0.031)	(0.0126)	(0.0141)	(0.0245)	(0.0149)
trade	-0.0105***	0.0243***	-0.00786***	0.00	0.0101***	-0.0141***
	(0.0031)	(0.003)	(0.0028)	(0.0021)	(0.0019)	(0.0023)
infl	0.0962**	0.336**	1.552***	-0.139***	0.0515	0.472***
	(0.0465)	(0.161)	(0.18)	(0.0198)	(0.038)	(0.0813)
agrva	-0.194***	-0.224***	-0.0153	-0.166***	-0.117***	-0.0179
	(0.038)	(0.045)	(0.0273)	(0.008)	(0.013)	(0.0147)
Constant	39.93***	35.91***	21.58***	35.66***	36.59***	26.00***
	(4.494)	(2.00)	(3.405)	(1.577)	(1.592)	(2.105)
Observations	328	328	211	331	331	218
N. countries/lags	86/1	86/1	72/1	87/1	87/1	74/1
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.14	0.68	0.60	0.12	0.62	0.14
Autocorr test III	0.13	0.60	0.56	0.59	0.44	0.17
Sargan test	0.66	0.53	0.49	0.58	0.50	0.36

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index.

Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; stockmktcap: stock market capitalization to GDP (%); tot_valtraded: stock market total value traded to GDP (%); logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrol_etr: school enrollment, tertiary (%gross); ln pop: natural log of population.

	gini net	gini gross	EHII	gini net	gini gross	EHII
L.Y	0.272***	0.132***	0.709***	0.659***	0.484***	0.439***
	(0.028)	(0.029)	(0.007)	(0.027)	(0.040)	(0.057)
turnover_stock	0.00335*	-0.00654***	-0.00283***	0.0890**	0.0384	0.169***
	(0.00175)	(0.0022)	(0.0002)	(0.0401)	(0.047)	(0.029)
spread				0.127***	0.0951***	-0.0249*
				(0.0197)	(0.0257)	(0.0151)
log_GDP_pc	-2.129***	-0.0178	-1.373***	0.992**	2.794***	-2.383***
	(0.58)	(0.444)	(0.098)	(0.415)	(0.674)	(0.567)
ln_pop	-0.0474	-2.072***	-0.0276	0.951**	0.271	2.150***
	(0.467)	(0.48)	(0.063)	(0.405)	(0.524)	(0.626)
enroll_tert	0.00518	0.0702***	0.00446*	-0.031***	-0.0267**	0.0321***
	(0.0064)	(0.0112)	(0.0027)	(0.012)	(0.0133)	(0.011)
govgdp	-0.00374	0.271***	-0.00218	-0.0568	0.0942	-0.169***
	(0.03)	(0.0463)	(0.0079)	(0.0474)	(0.0591)	(0.0364)
trade	-0.00301	-0.0102	-0.0103***	-0.0095**	-0.00483	-0.026***
	(0.0043)	(0.0064)	(0.0015)	(0.0044)	(0.0065)	(0.005)
infl	-0.0402	0.0262	0.651***	-0.0925	0.0593	-2.646***
	(0.054)	(0.059)	(0.0366)	(0.164)	(0.213)	(0.604)
agrva	-0.155***	-0.0435	-0.00956	0.0134	0.0672**	-0.0337
	(0.0525)	(0.085)	(0.0112)	(0.027)	(0.034)	(0.037)
Constant	47.01***	40.19***	25.77***	4.476	-1.224	43.29***
	(6.7)	(6.475)	(1.044)	(3.856)	(6.22)	(6.564)
Observations	377	377	212	338	338	225
N. countries/lags	87/1	87/1	73/1	104	104	80
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.55	0.02	0.26	0.20	0.61	0.075
Autocorr test III	0.58	0.71	0.22	0.36	0.58	0.322
Sargan test	0.33	0.45	0.36	0.69	0.20	0.438

Table 18. GMM model specification (1), 5 year average.

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index.

Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; turnover: stock market turnover ratio (%); spread: bank lending-deposit spread; logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrol_etr: school enrollment, tertiary (%gross); ln_pop: natural log of population.

1 able 19. Olvinvi model specification (2), 5 year average.	Table 19	. GMM model	specification	(2), 3	5 year average.
---	----------	-------------	---------------	--------	-----------------

	gini net	gini gross	EHII
L.y	0.528***	0.505***	0.808***
	(0.0031)	(0.0034)	(0.012)
privy	-0.0134***	-0.0432***	-0.0655***
	(0.0029)	(0.0016)	(0.0042)
privy_2	0.000112***	0.000197***	0.000315***
	(0.000)	(0.000)	(0.000)
log_GDP_pc	-3.590***	-1.818***	-0.899***
	(0.038)	(0.047)	(0.118)
ln_pop	1.008***	-0.541***	0.533***
	(0.067)	(0.077)	(0.045)
enroll_tert	0.0148***	0.0705***	0.0248***
	(0.000)	(0.000)	(0.0024)
govgdp	-0.0287***	0.204***	0.0721***
	(0.0107)	(0.0088)	(0.0104)
trade	-0.00156	-0.00939***	-0.0231***
	(0.0011)	(0.0016)	(0.0018)
infl	-0.129***	-0.0367**	0.0642
	(0.0172)	(0.0163)	(0.0754)
agrva	-0.0933***	-0.0806***	0.0227***
	(0.0052)	(0.0039)	(0.0083)
Constant	46.59***	37.04***	14.86***
	(0.603)	(0.603)	(1.385)
Observations	495	495	406
N. countries/lags	119/1	119/1	95/1
Time span	60-14	60-14	63-08
Controls	YES	YES	YES
Autocorr test II	0.13	0.90	0.25
Autocorr test III	0.53	0.95	0.17
Sargan test	0.36	0.55	0.93

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index. Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; privy: private credit as a % of GDP; logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; agrva: VA of agriculture as share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrol_etr: school enrollment, tertiary (%gross); ln_pop: natural log of population.

	gini net	gini gross	EHII	gini net	gini gross	EHII
L.y	0.444***	0.609***	0.652***	0.491***	0.518***	0.800***
	(0.0142)	(0.0193)	(0.0303)	(0.011)	(0.00616)	(0.0199)
bankdep_gdp	0.0359***	0.0257***	0.0582***			
	(0.0053)	(0.0054)	(0.0082)			
dep#indva	-0.00074***	-0.0006***	-0.0009***			
	(0.00016)	(0.000)	(0.00012)			
bank_priveredit				0.0381***	0.0295***	0.0257***
				(0.0031)	(0.0028)	(0.0056)
bankpriv#indva				-0.00024***	-0.0012***	-0.0003*
				(0.000)	(0.000)	(0.000)
log GDP pc	-1.657***	0.402**	-1.240***	-2.595***	-1.119***	-1.037***
	(0.259)	(0.166)	(0.201)	(0.16)	(0.099)	(0.179)
ln pop	1.282***	-0.0792	1.832***	0.759***	-0.312***	1.747***
	(0.134)	(0.124)	(0.157)	(0.076)	(0.064)	(0.198)
govgdp	-0.0692***	0.127***	0.041	-0.0871***	0.203***	0.0433**
	(0.0213)	(0.0317)	(0.0254)	(0.018)	(0.014)	(0.018)
trade	-0.0212***	-0.0320***	-0.0177***	-0.00668***	-0.0145***	-0.02***
	(0.003)	(0.0038)	(0.0019)	(0.0017)	(0.0017)	(0.0026)
infl	-0.264***	-0.172***	0.00502	-0.241***	-0.0669**	-0.0488
	(0.0112)	(0.0372)	(0.0682)	(0.0096)	(0.0311)	(0.056)
enroll_tert	0.0170***	0.0292***	0.0239***	-0.00166	0.0113***	-0.0104**
	(0.0044)	(0.007)	(0.0065)	(0.0023)	(0.0034)	(0.0048)
Constant	33.59***	14.48***	20.91***	40.20***	28.85***	13.46***
	(2.44)	(2.172)	(2.064)	(1.929)	(0.904)	(1.911)
Observations	420	420	332	471	471	382
N. countries/lags	114/3	114/3	90/3	118/2	118/2	94/2
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.05	0.18	0.49	0.39	0.28	0.34
Autocorr test III	0.69	0.37	0.24	0.79	0.49	0.25
Sargan test	0.61	0.41	0.40	0.51	0.49	0.43

Table 20. GMM model specification (3), 5 year average.

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index.

Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; bankdepgdp: bank deposit to GDP (%); bankprivcredit: private credit lent by banks as a %(GDP); logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; indva: value added by the industry sector as a share of GDP; trade: sum of export and import (%GDP); infl:annual growth rate of deflator; enrol_tert: school enrollment, tertiary (%gross); ln_pop: natural log of population.

Table 21. GMM model specification (3).	5	5 year average.
--	---	-----------------

	gini net	gini gross	EHII	gini net	gini gross	EHII
L.y	0.539***	0.277***	0.700***	0.622***	0.271***	0.686***
	(0.007)	(0.006)	(0.03)	(0.027)	(0.022)	(0.019)
stockmktcap	0.280***	0.0134***	-0.0798***			
	(0.008)	(0.005)	(0.01)			
stock#serva	-0.00395***	-0.000346***	0.00106***			
	(0.000)	(0.000)	(0.00)			
tot_valtraded				0.0421***	0.0126	-0.116***
				(0.0055)	(0.01)	(0.01)
totval#servva				-0.00044***	-0.00019	0.00165***
				(0.000)	(0.000)	(0.000)
servva	0.115***	0.0660***	0.0911***	0.108***	0.131***	0.0613***
	(0.007)	(0.008)	(0.01)	(0.0155)	(0.024)	(0.0056)
log_GDP_pc	-2.480***	-0.023	-1.669***	-1.670***	-0.733***	-1.314***
	(0.075)	(0.097)	(0.19)	(0.305)	(0.193)	(0.106)
ln_pop	0.276**	-0.787***	-0.506**	0.972***	0.814***	0.0716
	(0.129)	(0.146)	(0.20)	(0.171)	(0.193)	(0.092)
govgdp	-0.0355***	0.130***	-0.115***	-0.0115	0.048	-0.0400**
	(0.013)	(0.026)	(0.02)	(0.027)	(0.034)	(0.017)
trade	-0.00534***	0.0122***	-0.00449***	-0.00698**	0.0250***	-0.00476**
	(0.002)	(0.0021)	(0.00)	-0.00322	(0.0035)	(0.0019)
infl	-0.174***	0.0930**	1.169***	0.261***	0.290**	0.470***
	(0.019)	(0.041)	(0.10)	(0.061)	(0.143)	(0.0987)
enroll_tert	-0.0240***	0.0427***	-0.0104***	-0.0160***	0.0308***	0.000131
	(0.0036)	(0.003)	(0.0035)	(0.0047)	(0.007)	(0.0035)
Constant	33.05***	27.38***	26.47***	20.23***	26.13***	22.73***
	(0.81)	(1.09)	(2.39)	(3.362)	(2.266)	(1.6)
Observations	331	331	211	329	329	218
N. countries/lags	87/1	87/1	72/1	87/1	87/1	74/1
Time span	60-14	60-14	63-08	60-14	60-14	63-08
Controls	YES	YES	YES	YES	YES	YES
Autocorr test II	0.08	0.64	0.83	0.11	0.49	0.293
Autocorr test III	0.40	0.43	0.78	0.12	0.45	0.278
Sargan test	0.70	0.65	0.62	0.68	0.53	0.3921

L.Y refers to the lagged of the dependent variable, respectively the net, gini gross and the EHII index.

Notes: gini_gross and gini_net: net and gross Gini (from Solt, 2009); EHII: income inequality from UTIP_UNIDO; stockmktcap: stock market capitalization to GDP (%); tot_valtraded: stock market total value traded to GDP (%); logGDPpc: natural logarithm of real per capita GDP in Constant USD; govgdp: government share of total expenditure; serva: value added by the service sector as a share of GDP; trade: sum of export and import (%GDP); infl: annual growth rate of deflator; enrol_tert: school enrollment, tertiary (%gross); ln_pop: natural log of population.

Sub-section 5: Main robustness checks.

Model in logarithms.

Table 22. Results from fixed effect panel estimation, specification (1), with log_EHII as independent variable (1963-2008).

	log_EHII	log_EHII	log_EHII	log_EH	II log_EHII
	1	2	3	4	5
log_tert	0.012	-0.005	0.001	-0.00552	-0.0175
	(0.011)	(0.009)	(0.015)	(0.0144)	(0.0111)
log_secondary	-0.0550***	-0.0419***	-0.0550**	-0.0618***	-0.0108
	(0.020)	(0.015)	(0.023)	(0.0213)	(0.0215)
log_open	-0.007	-0.011	-0.025	-0.000655	-0.0202
	(0.012)	(0.010)	(0.016)	(0.016)	(0.0143)
infl	-0.0306*	-0.00758**	0.0612***	0.0563**	-0.0231
	(0.019)	(0.003)	(0.023)	(0.0231)	(0.0162)
log_GDP_pc	-0.0237	-0.106***	-0.101**	-0.0874*	-0.0704***
	(0.019)	(0.018)	(0.045)	(0.0451)	(0.0238)
agrva	0.00457***	0.00589***	-0.002	-0.00341*	0.00390***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.0012)
ln_pop	-0.103***	-0.114***	-0.223***	-0.136*	-0.187***
	(0.0343)	(0.027)	(0.049)	(0.071)	(0.0331)
log_unempl	0.0342***	0.0214***	0.0240***	0.0138**	0.0225***
	(0.00534)	(0.004)	(0.007)	(0.0064)	(0.006)
log_gov	-0.0133	-0.013	-0.008	-0.0125	-0.009
	(0.0143)	(0.012)	(0.0197)	(0.0198)	(0.017)
Constant	4.239***	5.023***	5.189***	5.088***	4.630***
	(0.217)	(0.21)	(0.455)	(0.468)	(0.278)
log_spread	0.00692**				
	(0.00335)				
log_tot_valtrad		-0.00721***			
		(0.00147)			
log_bankdep_gdp			0.0475***		
			(0.013)		
log_stockmktcap				-0.0162***	
				(0.00454)	
log_bank_priv					0.0518*
					(0.0267)
log2_bank_priv					-0.00091
					(0.0013)
Observations	641	735	488	496	515
N. countries	73	68	69	63	70
R-squared	0.36	0.457	0.328	0.334	0.395
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Time span	63-08	63-08	63-08	63-08	63-08

	log gini gro.	ss log gini gros	s log gini gross	log gini gro	ss log gini gross
	1	2	3	4	5
log tert	0.006	0.010	0.019	0.015	0.0256*
	(0.005)	(0.013)	(0.012)	(0.012)	(0.0143)
log secondary	0.0246**	-0.0664***	-0.103***	-0.0400***	0.0193
0_	(0.013)	(0.021)	(0.021)	(0.014)	(0.0184)
log open	-0.009	-0.0499***	-0.022	0.007	0.0519
0_ 1	(0.015)	(0.014)	(0.014)	(0.005)	(0.0391)
infl	0.0734***	0.006	0.00601**	0.124***	0.0171
	(0.013)	(0.005)	(0.003)	(0.023)	(0.0354)
log GDP pc	0.149***	0.137***	0.166***	0.00321***	0.000334
	(0.022)	(0.023)	(0.022)	(0.001)	(0.0003)
agrva	0.00275**	0.00301***	0.00192*	-0.408***	-0.000503
c	(0.001)	(0.001)	(0.001)	(0.042)	(0.0015)
ln pop	-0.347***	-0.425***	-0.307***	0.0750***	-0.260***
	(0.041)	(0.040)	(0.039)	(0.006)	(0.053)
log unempl	0.0686***	0.0871***	0.0844***	-0.002	0.0546***
0_ 1	(0.007)	(0.006)	(0.006)	(0.016)	(0.007)
log_gov	0.026	-0.009	-0.001		0.00871
	(0.018)	(0.016)	(0.016)		(0.027)
Constant	2.881***	3.808***	3.278***	3.527***	4.072***
	(0.260)	(0.251)	(0.234)	(0.272)	(0.409)
log_spread	0.00647				
	(0.0047)				
log_tot_valtrad		-0.00500**			
		(0.002)			
log_bankdep_gdp			-0.003		
1 / 1 1/			(0.009)	0.005	
log_stockmktcap				0.005	
log bank priv				(0.003)	0.0810**
log_ballk_pilv					(0.035)
log2 bank priv					0.00626***
log2_ounk_priv					(0.00020)
Observations	979	1 059	1 124	1 108	707
N. countries	89	77	99	82	90
R-squared	0.48	0.458	0.442	0.457	0.364
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Time span	60-14	60-14	60-14	60-14	60-14
r mo spun	00 17	00-1-1	00-14	00-1-	00-14

Table 23. Results from fixed effect panel estimation, specification (1), with log_gini gross as independent variable (1960-2014).

	log_gini net	log_gini net	log_gini ne	log_gini nei	log_gini net
	1	2	3	4	5
log_tert	0.011	-0.003	0.008	0.000	0.0451***
	(0.014)	(0.013)	(0.012)	(0.013)	(0.0144)
log_secondary	-0.015	-0.0455**	-0.0774***	-0.0384*	-0.132***
	(0.024)	(0.022)	(0.021)	(0.022)	(0.0232)
log_open	0.016	-0.005	0.0290**	0.004	0.00546
	(0.016)	(0.014)	(0.014)	(0.015)	(0.018)
new_infl	0.0463*	0.003	0.00644**	0.0106**	-0.02
	(0.026)	(0.006)	(0.003)	(0.005)	(0.0254)
log_GDP_pc	0.157***	0.0926***	0.153***	0.121***	-0.0273
	(0.025)	(0.024)	(0.022)	(0.025)	(0.031)
agrva	0.00222*	0.00376***	0.001	0.00348***	-4.44E-05
	(0.001)	(0.001)	(0.001)	(0.001)	(0.0015)
ln_pop	-0.115**	-0.171***	-0.117***	-0.144***	-0.239***
	(0.047)	(0.041)	(0.039)	(0.047)	(0.0481)
log_unempl	0.0634***	0.0566***	0.0558***	0.0488***	0.0147**
	(0.0076)	(0.007)	(0.007)	(0.007)	(0.0073)
log_gov	-0.015	-0.0308*	-0.012	-0.016	-0.0717***
	(0.020)	(0.017)	(0.016)	(0.017)	(0.0262)
Constant	2.125***	3.149***	2.561***	2.683***	4.958***
	(0.28)	(0.258)	(0.236)	(0.282)	(0.374)
log_spread	0.0113**				
	(0.0052)				
log tot valtrad	× ,	0.001			
0		(0.0022)			
log bankdep gdp		. ,	-0.0357***		
			(0.009)		
log_stockmktcap				0.003	
				(0.0034)	
log_bank_priv					-0.028
					(0.0323)
log2_bank_priv					0.00289*
					(0.0016)
Observations	893	1,059	1,124	1,038	744
N. countries	86	77	99	77	92
R-squared	0.331	0.243	0.286	0.259	0.248
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Time span	60-14	60-14	60-14	60-14	60-14

Table 24. Results from fixed effect panel estimation, specification (1), with log_ gini net as independent variable (1960-2014).
	log_EHI	log_gini net	log_gini gross
log_privy	-0.0767*	-0.0116*	-0.0698**
	-0.0433	-0.00627	-0.0312
log2privy	0.00576***	not signific.	0.00523***
	-0.0019		-0.00156
log_tert	0.0459***	0.0104	0.0496***
	-0.0147	-0.0122	-0.0141
log_secondary	-0.0650***	-0.0690***	-0.101***
	-0.0242	-0.02	-0.0230
log_open	0.0414***	0.0243*	0.0329*
	-0.016	-0.014	-0.0184
new_infl	0.0487	0.00769***	0.0332
	-0.0401	-0.00276	-0.0254
log_GDP_pc	0.0223	0.136***	-0.0130
	-0.0382	-0.0215	-0.0304
agrva	-0.00238	0.00179*	-0.0015
	-0.00202	-0.00105	-0.0015
ln_pop	-0.119***	-0.131***	-0.246***
	-0.04	-0.0389	-0.0465
log_unempl	0.0275***	0.0548***	0.0565***
	-0.00669	-0.00644	-0.0071
log_gov	0.0720***	-0.0164	0.0203
	-0.0277	-0.0161	-0.0258
Constant	3.697***	2.650***	4.534***
	-0.391	-0.237	-0.381
Observations	396	1,155	766
N. countries	64	100	93
R-squared	0.335	0.281	0.439
Country FE	YES	YES	YES
Year FE	NO	YES	YES
Time span	63-08	60-14	60-14

Table 24. Results from fixed effect panel estimation, specification (2), with variables in logs.

	1	2	3	4
	log_gini gross	log_gini gross	log_gini gross	log_gini gross
log_bank_priv	-0.0857*			
	[0.0446]			
log2_bank_priv	0.00650***			
	[0.00167]			
c.log_bankpriv#c.indva	0.0000986			
	[0.00101]			
log_bankdep		0.0804***		
		[0.022]		
c.log_bankdep#c.indva		-0.00293***		
		[0.0007]		
log_stockmktcap			0.00988	
			[0.0112]	
c.log_stockmktcap#c.servva			-0.00024	
			[0.0002]	
log_tot_valtrad				0.00988
				[0.0112]
c.log_tot_valtrad#c.servva				-0.00024
				[0.0002]
Number of obs	744	1124	1059	1059
Number of country	92	99	77	77
R-squared	0.446	0.455	0.46	0.46
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Time span	60-14	60-14	60-14	60-14
-				

Table 24. Results from fixed effect panel estimation, specification (3), with variables in logs.

1	2	3	4	
log_gini net	log_gini net	log_gini net	log_gini net	
-0.0910**				
(0.0437)				
0.00280*				
(0.0016)				
0.00216**				
(0.000)				
	0.0172			
	(0.0224)			
	-0.00173**			
	(0.0006)			
		-0.00984		
		(0.014)		
vva		0.00023		
		(0.0002)		
			-0.00534	
			(0.0115)	
a			0.00011	
			(0.0001)	
744	1 1 2 4	1.028	1.050	
/44	1,124	1,038	1,039	
92	99	11	//	
0.254	0.291	0.26	0.244	
YES	YES	YES	YES	
YES	YES	YES	YES	
60-14	60-14	60-14	60-14	
	1 log_gini net -0.0910** (0.0437) 0.00280* (0.0016) 0.00216** (0.000) //va a 7/va a 7/44 92 0.254 YES YES 60-14	1 2 log_gini net log_gini net -0.0910** (0.0437) (0.0437) 0.00280* (0.0016) 0.00216** (0.000) 0.0172 (0.0224) -0.00173** (0.0006) 0.0006)	1 2 3 log_gini net log_gini net log_gini net log_gini net -0.0910** (0.0437) 0.00280* 0.00280* (0.0016) 0.00216** (0.0000) 0.0172 (0.0224) -0.00173** (0.0006) -0.00984 (0.014) .vva .000233 (0.0002) .000023 a 744 1,124 1,038 92 99 77 0.254 0.291 0.26 YES YES YES YES YES YES YES YES YES YES 60-14 60-14 60-14 60-14	

Table 25. Results from fixed effect panel estimation, specification (3), with variables in logs.

	1	2	3	4
	log_EHII	log_EHII	log_EHII	log_EHII
log_bank_priv	0.115***			
	(0.0403)			
log2_bank_priv	-0.00107			
	(0.0013)			
c.log_bankpriv#c.indva	-0.00195**			
	(0.0008)			
log_bankdep		0.0237		
		(0.0188)		
c.log_bankdep#c.indva		-0.00105*		
		(0.0005)		
log_stockmktcap			0.004	
			(0.0103)	
c.log_stockmktcap#c.servva			-0.000139	
			(0.00018)	
log_tot_valtrad				0.00955
				(0.0073)
c.log_tot_valtrad#c.servva				-0.000282**
				(0.00012)
	515	770	701	725
Number of obs	515	//9	/01	/35
Number of country	/0	82	68	68
R-squared	0.407	0.384	0.44	0.465
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Time span	60-08	60-08	60-08	60-08

Table 26. Results from fixed effect panel estimation, specification (3), with variables in logs.

	FE annual		system GMM 5 year			
	EHII	gini net	gini gross	EHII	gini net	gini gross
lly	-0.01945***	0.0378***	0.032***	-0.042***	-0.117***	-0.078***
	[0.0058]	[0.00824]	[0.0101]	[0.003]	[0.0027]	[0.0043]
lly2	0.0001***	not signif	not signif	0.002***	0.000***	0.000***
	[0.0000]			[0.0000]	[0.0000]	[0.0000]
Observations	1970	2153	2153	410	465	439
N. countries	103	125	125	94	110	108
R-squared	0.269	0.169	0.263			
Controls	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES			
Year FE	YES	YES	YES			
Time span	63-08	60-14	60-14	63-08	60-14	60-14
Autocorr test II				0.526	0.139	0.48
Sargan test				0.38	0.64	0.95

Table 27. FE and GMM analysis by using *lly* as alternative proxy for financial intermediation size.