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Introduction

"[...] There will be no speculative exploits with the bank's money. Neither will any officer be allowed to speculate or to become financially interested in any other business. We will pay good salaries, and there won't be any rake-offs of any kind whatsoever.

Amadeo P. Giannini

In the last few years the public opinion and the academic world has gradually risen awareness on the unprecendent increase in the level and growth of income inequality worldwide, also including developed economies, despite an improvement of the employment rates (OECD, Nov. 2016) . Many co-founding factors might have accounted for to sustain this trend over the years, such as the decrease of the bargaining power of workers (Diamond, 2016), the structural change (Kum, 2008), the globalisation and technology process (Jaumotte et al, 2013), the skill biased technological change and the tax system (Denk,Cazenave-Lacroutz, 2015) and the financial development (Beck et al.2007, Tan and Law, 2014). In this work I put the accent on the latter and its pervasive role in shaping the income distribution and the resource allocation on a macro level across Countries and from a micro perspective, among households.

Finance is not an immutable and static phenomenon; it has evolved over the decades, up to a point where it has started playing a pervasive role in shaping the real economy. Moreover, its crucial role in credit allocation and saving process make it a very influential tool to affect the income distribution and the insurance ability of the households.

The definition of financial development is rather comprehensive and includes not only the size and the efficiency of financial intermediation but also the financial and, more specifically, banking deregulation which has shaped dramatically the financial sector and institutions over the decades, most likely affecting households' consumption choices as well. Indeed, sheding light on this relationship might have important implications for policymakers, who are asked to design proper financial reforms to improve the financial institutions, by also taking into account the distributional effects that they may exert.

The general purpose of this work deals with assessing the relationship between financial development, in its broader meaning, and income inequality, by implementing a different set of dataset and methodologies. Furthermore, to indagate this link at its fullest and in the most comprehensive way, I will first look at this relationship by adopting a macroeconomic approach to get insights on the general trends across economies worldwide, and gradually zooming in, to conclude with a microeconometrics based analysis of Italian households.

‘Inequality and financial development: a multidimensional approach’.

The first chapter indagates the link between financial development, in its different dimensions such as the efficiency, the size and the financial structure with respect to income inequality, by adopting a macroeconomic approach and relying on a long data panel of Countries. The analysis spans from 1960 up to 2014, with the latest and the most updated dataset and it implements both the fixed effect estimator and the system GMM. This work aims at sheding further light on the potential mechanisms which perpetuates inequality over time and last, it provides insight for policymakers in terms of income distribution and financial sector growth. Indeed, first I analyse whether different financial structures, such as bank systems versus stock markets based economies, might exert a different effect on the level of income inequality. Besides, given the deep change in the real economy's structure which has been taking place over the last decades, it is worthy to indagate whether the real and the financial structures might interact with each other and whether some qualitative differences in terms of inequality might arise. The intuition behind stems from observing more stock market based and service oriented economies displaying higher levels of inequality (such as the USA and the UK). On the other hand, there are some other economies more bank based and industry oriented, like Germany and the Scandinavian countries, which are well known for their low levels of inequality. Is it perhaps possible to generalize to a wider scale these country specific trends?

Second, I test the non-linearity hypothesis of the size dimension (in terms of the whole amount of credit lent to the private sector), to indagate whether ‘too much credit’ might be harmful in terms of income distribution (Stiglitz, 2015). I also disantangle the private credit sector for a subsample of developed economies, for which data are available, on the basis of the type of borrower, namely households or firm. Indeed, the credit lend to households might be less productive than the one borrowed by firms, which is instead more involved in the productivity process, in the labour market channel, and in profitable investments (Bezemer and Samarina, 2016; Beck et al. 2012). The credit to firms, then, might exert some positive spillover effects which might lower the level of inequality.

Last, given the importance of relying on an efficient and consequently stable banking system, I test the hypothesis that more efficient banking systems can make the economies more equal in terms of income distribution. In fact, more efficient banking systems tend to better screen and monitor the borrowers and invest in better and more profitable projects.

This paper points out i) a different and significant qualitative impact of the financial structure in terms of income inequality; ii) a joint effect of the real and the financial structure; iii) a non linear relationship between the size and the level of inequality; iv) an opposite trend when the private sector is disantangled between firms and households; v) more efficient banking

systems tend to be associated with more equal economies.

‘’Banking structural reforms and top income inequality: regulate or deregulate?’.

The unprecedent rise in top income shares over the last decades in the developed economies has been widely recognised by Piketty and Saez (2014). There is some evidence that a considerable amount of those top income earners are employed in the growing financial sector (Denk, 2015). Hence, I investigate whether some structural and privatisation banking reforms, which can alter both the financial institutions and the financial industry, exert substantial effects on the right tail of the income distribution. I evaluate the impact of similar banking reforms, which took place in Canada and Italy between the end of the 1980s and the beginning of the 1990s, on the top income shares, using macro level data. The banking reforms exploited as exogenous events are the ‘Privatisation Banking law’ in 1990 and the ‘Consolidation banking Act’ in 1993 in Italy, the ‘Financial institutions and deposit insurance amendment act’ in 1987 in Canada. These banking reforms changed the structure of the banking system and its institutions, favouring a higher integration among them and a higher banking concentration. Besides, in the case of Italy, also a huge privatisation wave was undertaken within the banking sector. This paper shows, by implemeneting the novel Synthetic Control Methodoology (SCM), how banking reforms do matter in terms of top income distribution. Besides, I studied the potential channels via which the banking deregulation might have operated, such as the stock market prices following the banking conosolidation wave, the banks’ margins deriving from non-interest income activities, the increase in the bank branches and the contextual drop in the number of financial institutions.

Results suggest that banking reforms caused, in both countries, an increase of the top income shares (top10, top5, top1 and top0,1 percentiles) and many of the potential channels appear to explain the treatment effect of the banking reforms. The contributions of this work are multiple, with respect to the methodology and its novelty in the study of top income inequality , but also to the type of financial reforms evaluated in my work. Last, I explore the potential mechanisms which have been cited in the literature but, to the best of my knwoledge, never empirically tested.

‘Banking deregulation and households’ consumption behaviour. The case of Italy in the early 1990’s.

In the third and last chapter an additional concept of inequality is investigated, namely the ability of households to insure against income shocks and to smooth consumption. The work

focuses on the case of Italy and rely on the high quality and detailed microeconomic survey data provided by the Bank of Italy, the 'Survey of households' income and wealth' (SHIW). Credit markets and banking institutions play a crucial role in channelling households' savings and affecting agents' consumption choices, even more pervasively in Italy, a well known bank-based economy (Paiella, 2003). Hence, banking reforms are expected to affect households' balance sheets and their consumption smoothing choices, which has a consequent impact on the level of income and consumption inequality. This paper aims, first, at investigating whether the banking deregulation, which took place in the early 1990's in Italy, has contributed to change the sensitivity of consumption to transitory and permanent income shocks among the Italian households. The wide heterogeneity among the households' sample is exploited to better study the different reactions to the same event. Besides, the efficiency of the credit market is tested by looking at the estimates of the insurance factor loadings (parameters which estimate how a 1 percent change in either permanent or transitory income shock affects the consumption growth) and their dynamic pre and post-deregulation. Last, given the wider inequality gap (defined as the income inequality less the consumption inequality) after the banking deregulation, a further analysis is carried out to shed light on the role exerted by the financial deregulation on this uprising trend. This analysis points out a decrease (improvement) in the permanent insurance parameter after the banking deregulation across all the different subsamples, while more mixed results are obtained with respect to the transitory insurance parameter (it increased in some cases, meaning a worsening of the ability to insure against transitory shocks). The paper provides a detailed analysis of the possible explanations and mechanisms which might justify these results. Furthermore, banking deregulation (and not only changes in the labour market and in the taxation system) seems to affect significantly the inequality gap, apporting an additional contribution to the literature and sheding further light on the possible co-founding factors.

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

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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). We also test whether the level of economic development and the real economy's structure may interfere with the way financial development does affect income inequality. Both the static fixed effect and the dynamic GMM estimator apply to our sample. 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) who gets the credit matter; 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

[1] Fernández, 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)

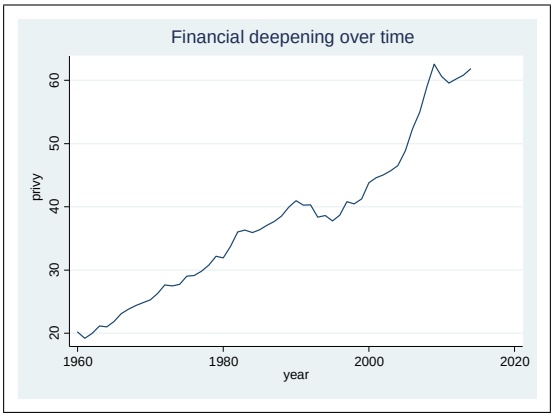

Figure 1: Pattern of the variable 'privy'over time, as proxy of financial deepening. Source: author's calculation based on GFDD dataset.

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 perhaps 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 embrace 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 households 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 surprisingly, 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.

[3] Stiglitz, 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) who gets the credit matters. 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; 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

[4] With 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 to perpetuate inequality over time (according to the 'new classical approach', see Mooknerjee and Ray

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 develops. 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.

On the other hand, there are some works which do not predict a convergence in the

(2003)).

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]

[5] They 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.

[6] They 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.

[7] The '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.

[8] Stockhammer (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

[9] Afterwards 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.

[10] The 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.

[11] He 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 finanical 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.[13]Their 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-

[13]They 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.

[14]They 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 non-linear 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

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

[17] They implement a pooled regression analysis, followed by a static fixed effcet 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.

[18] See 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]

[19] We 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.

[20] All 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.

[21] Following 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.

[22] For 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.

[23] The 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).

[24] To 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.

Table 1: Description of variables

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 Housohold 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

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 horizion. 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.

Depth This is the dimension that has been tested the most in the previous literature 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).

[28] The 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*) are also

[29] As 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.

[30] Moreover, 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.

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*). [31] 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 and may influence government's decisions). When it comes at trade openness, the Stolper-Samuelson theorem is the theoretical framework which can be used to directly link the prices of traded goods and the wage distribution of those ones employed in the tradable sectors. The theorem predicts that trade liberalization will increase the relative prices of the labour (capital) intensive good, consequently making labour income workers better off (worse-off) and capital worse-off (better off). Loosely speaking, it states that imports from low income countries has a twofold effect in developed economies: they decrease the labour demand for low skilled and increase the demand for high skilled workers. Hence, the skill premium in developed economies should rise a direct consequence of the decrease demand for the unskilled, following the imports from the low income countries. The trade should then harm inequality in developed economies, while boosting a more fair redistribution in low income economies.

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.[32] In the baseline model, the fixed effects estimator is applied to take

[31] According to Cuaresma and Roser (2016), the net exports as proxy for openness (trade) might not be the most suited to investigate the impact of trade liberalization on the level of inequality. They use the imports and exports separately, testing how each of these flows exert an impact on inequality, by restricting the sample to developed economies only. Nonetheless, we prefer to use the standard proxy 'trade'(net exports) given its more common use in the previous literature and in order to ease the comparison with similar works.

[32] Annual 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.

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).[33] 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 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:[34]

$$Y_{i,t} = \beta_0 + \beta_1 FD_{i,t} + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t} \tag{1}$$

$$Y_{i,t} = \beta_0 + \beta_1 FD_{i,t} + \beta_2 FD^2_{i,t} + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t} \tag{2}$$

$$Y_{i,t} = \beta_0 + \beta_1 FD_{i,t} + \beta_3 Interactions_{i,t} + \beta_j X_{i,t} + \gamma_t + \alpha_i + \varepsilon_{i,t} \tag{3}$$

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

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.

[33] However, Barro (2000) argues that country fixed effects estimator would eliminate all the cross-sectional 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.

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

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).[35] Therefore, we want to test whether the real structure of the economy and its changes can determine the degree of which finance may affect income inequality.[36] 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

[35] Allen, 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; whilst the more human capital and knowledge intensive firms are more stock/financial market oriented.

[36] Clarke, 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:

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

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

this interaction:[37]

$$\beta_3(stockmkt_structure_{i,t} \cdot serviceV.A\%_{i,t})$$
$$\beta_3(bank_structure_{i,t} \cdot industryV.A\%_{i,t})$$

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, 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) [38].

[37] We 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.

[38] Blundell 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

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 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.

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).

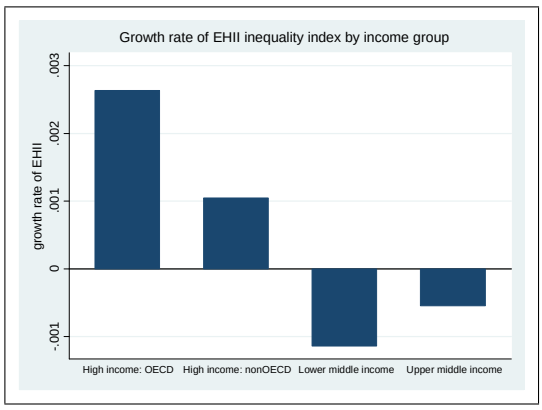

Figure 2: Growth rates of income inequality, by income group. Sources: author's calculation based on UTIP-UNIDO dataset.

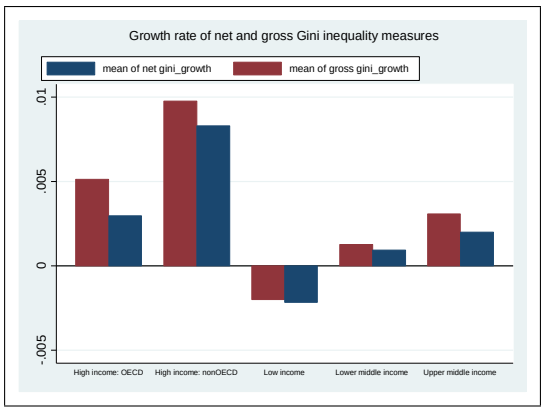

Figure 3: Growth rates of gini indicators, by income group. Sources: author's calculation based on SWIID dataset.

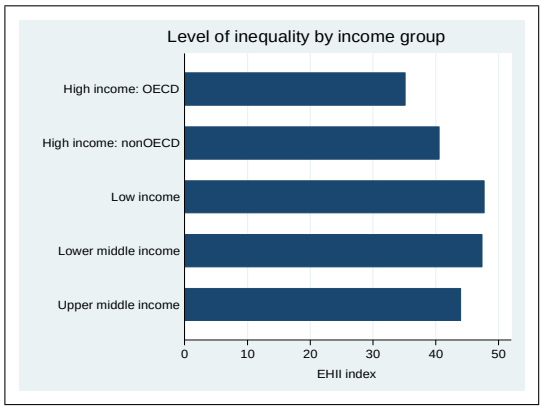

Figure 4: Mean level of income inequality (EHII), by income groups. Sources: author's calculations based on UTIP_UNIDO dataset.

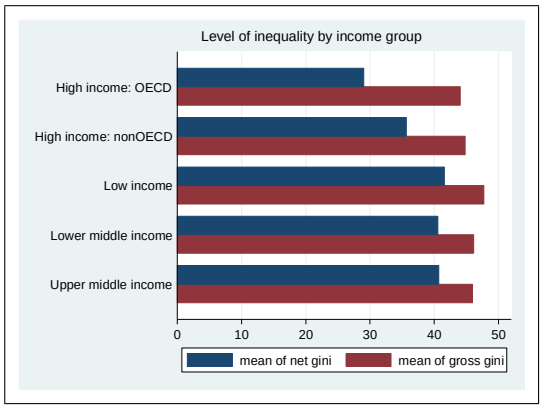

Figure 5: Mean level of income inequality (net and gross Gini), by income groups. Sources: author's calculations based on SWIID dataset (Solt, 2009).

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 con-

firmed, 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.[39] 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 level of economic development (*logGDPpc*) 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.

[39] 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.

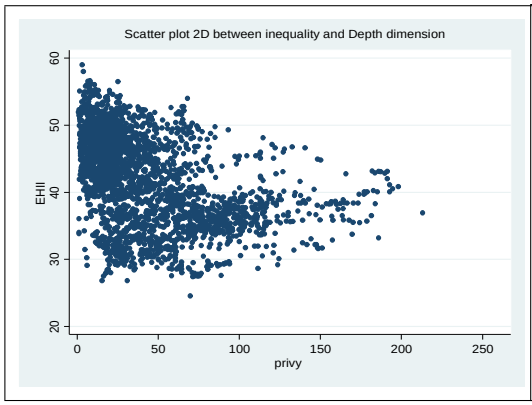

Figure 6: Scatter 2D displaying the relationhip between the EHII index and the level of financial deepening. Sources: Author's calculations based on the financial dataset.

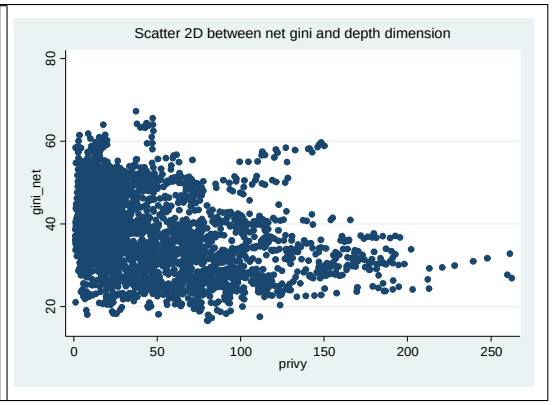

Figure 7: Scatter 2D displaying the relationship between the net gini index and the level of financial deepening. Sources: Author's calculations based on the financial dataset.

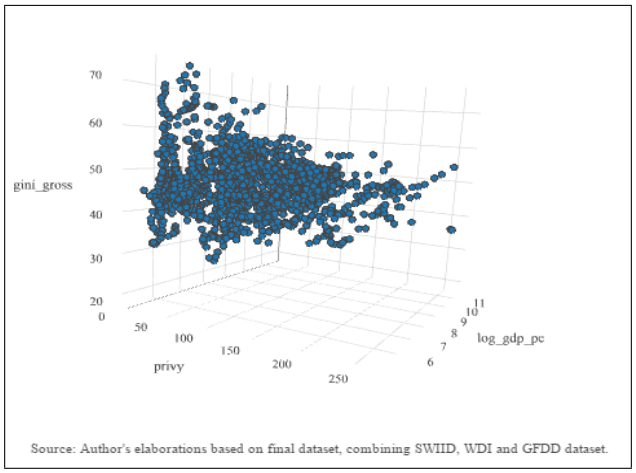

Figure 8: Scatter 3D between gross gini, depth dimension and level of economic development.

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.[40]

[40] The 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.

4.1 Annual Data analysis

The results of the first model specification (1) are presented in Table 2.[41] 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 *gini 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 *bankdepgdp* and *bankprivcredit* turn out to be positive and significant, mostly at 1% level. To briefly sum up the model specification (1), higher 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

[41] We also run the fixed effect model on annual data by clustering the standard errors on country level to account for potential serial correlation of aggregate shocks (not reported but available upon request). However, results seem to be robust and they do not change remarkably from the baseline analysis. Moreover, the second part of this work that applies a system GMM estimator, using 5 year averaged data, already partly deals with this potential issue.

Table 2: Estimates from annual panel data, model specification (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
	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
	EHII	gini net	gini gross
bankprivcredit	-0.002	0.013***	0.011***
	(0.0036)	(0.003)	(0.004)
Observations	906	1,323	1,323
N. countries	86	104	104
R-squared	0.293	0.218	0.349
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Time span	63-08	60-14	60-14
	EHII	gini net	gini gross
bankdepgdp	0.0124**	0.005	0.0190***
	(0.006)	(0.00571)	(0.007)
Observations	881	1,292	1,292
N. countries	85	103	103
R-squared	0.298	0.208	0.348
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).

	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)
logGDPpc	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

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 term turns positive and significant at 1% level (despite its small size).[42] Figure 9 shows

[42] This 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, low-

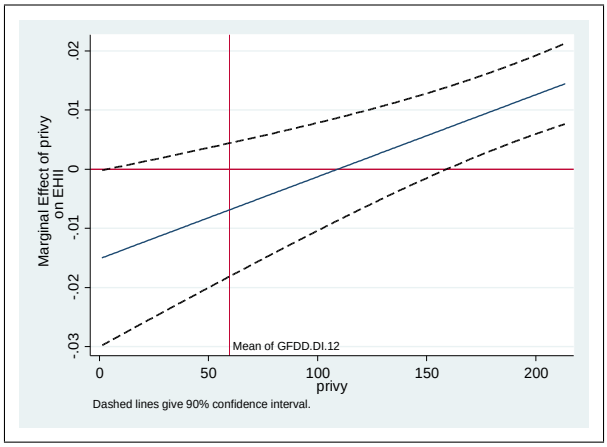

Figure 2: Figure 9: Marginal effects of privy% on the EHII index. Sources: Author's calculations based on the final dataset.

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.

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

middle, low). Results are available upon request.

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

	EHII (a)	gini net (b)	gini gross (c)	EHII (d)	gini net (e)	gini gross (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)	/	/
logGDPpc	-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)
inflat	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)
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

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

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 pro-equality 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 results from all the regressions in Table 4 and in Table 3 (where it displays a negative sign but signficant only with EHII as dependent variable): more opened economies tend to be associated with lower level of income inequality (in line with previous results as in Milanovic, 2005; Wade, 2004; Reuveny and Li, 2003 but against the findings in Cuaresma and Roser, 2016).[43] A negative effect of trade on inequality might be also read as a substantial role exerted by labour union in developed economies and not predicted by the Stolper-Samuelson theorem: in developed economies, where the import sector

[43] Cuaresma and Roser (2016) find that imports from low income economies do boost the level of inequality in industrialised economies. However, our different results might be due to a different sample composition..

might be damaged by a higher degree of openness, the labour union might intervene to limit the loss deriving from the international trade. Hence, the skill premium might be more limited in size and the overall effect might translate into a genuine improvement along the level of inequality in developed countries. This effect might also be reinforced if we look at the developing countries, where a high share of workers are still employed in primary sector, whose exports might favour the low skilled workers. Moreover, the inequality proxies employed in this work (the EHII and the Gini index) are calculated in such a way that the extreme tails of the income distribution are not really taken into account (disregarding the capital gains, etc.) and this could capture mostly the effect of trade on the middle income distribution. Jaumotte (2013) finds a pro-inequality effect of trade on the top income quintile and a lower level of inequality associated to the bottom four quintiles, which seems to be in line with our results too. Besides, the Stolper-Samuelson theorem assumes lack of factor mobility, which seems to limit extensively the implications of current trade, especially within tradable service sector.

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 higher education is a valid and a crucial tool to boost equality (both in terms of opportunities and outcome). The coefficient of the level of economic development is first positive when we look at the full sample (mixed economies) in Table 3, ranging between 1,18 and 5,49, while it shows a negative and significant sign in Table 4, on the subsample of developed economies, suggesting a substantially different impact on the level of inequality.

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

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

	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
R-squared	0.37	0.219	0.417	0.379	0.175	0.394
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
bankdepgdp	-0.0724**	-0.110***	-0.160***			
	(0.0324)	(0.0353)	(0.0451)			
c.bankdepgdp#c.logGDPpc	0.00801**	0.0115***	0.0181***			
	(0.00318)	(0.00338)	(0.0043)			
bankprivcredit				-0.018	-0.142***	-0.0842**
				(0.0298)	(0.0286)	(0.0374)
c.bankprivcredit#c.logGDPpc				0.00188	0.0150***	0.00918**
				(0.0029)	(0.0027)	(0.0036)
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

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

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

	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***
				(0.00038)	(0.0004)	(0.0005)
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)
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

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

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-

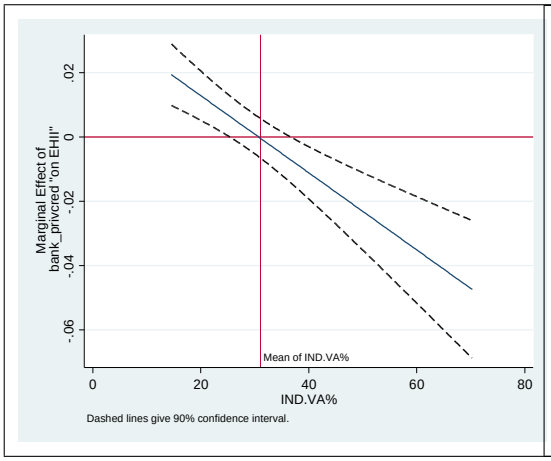

Figure 10: Marginal effects of industry VA and banking structure on EHII index. Source: Author's elaboration based on SWIID, WDI and GFDD dataset

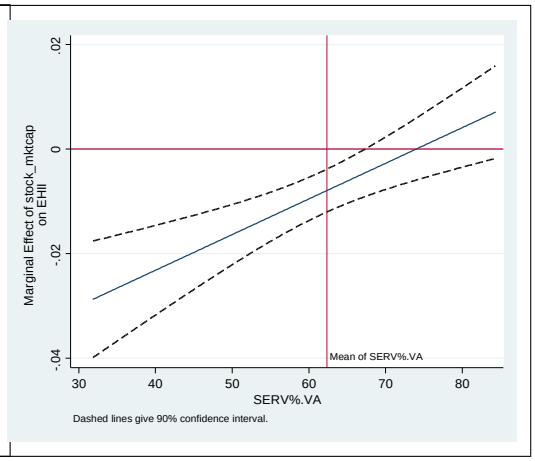

Figure 11: Marginal effects of service VA and stock market size on EHII index. Source: Author's elaboration based on SWIID, WDI and GFDD dataset

cient.[44]

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

[44] This 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).

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 diverse dimensions of financial development and income inequality. Hence, for the sake of brevity, only the main results will be reported and 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).[45] 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,

[45] 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.

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

	gini net	gini gross	EHII	gini net	gini gross	EHII
bankprivcredit	0.0367***	0.0157***	0.0137***			
	(0.00134)	(0.0023)	(0.0031)			
bankdepgdp				0.0110***	0.0113***	0.0478***
				(0.0026)	(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

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

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

	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

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

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 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

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

	gini net	gini 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<0.05, *p<0.1

Table 10: Model specification (3), 5 years 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***	0.0295***	0.0257***
				(0.0031)	(0.0028)	(0.0056)
bankprivcredit#indva				-0.000242***	-0.00116***	-0.000296*
				(0.0001)	(0.0001)	(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

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

is always negative.[46]

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.[47] The model has been 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

[46] The 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.

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

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 U-*

shape, 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 conjoint 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.

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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	Seychelles
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.

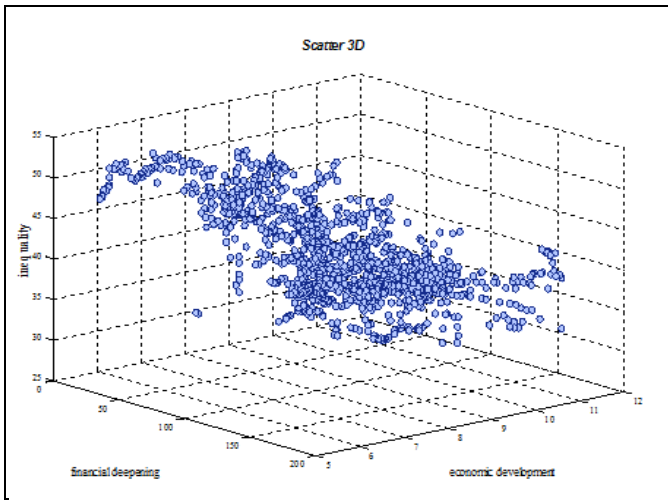

Figure 12: 3D Scatter plot (elaborated in Matlab) which display the relationship among three variables: financial deepening (privy), economic development (logGDP_pc) and inequality (using gross_gini variable). Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.

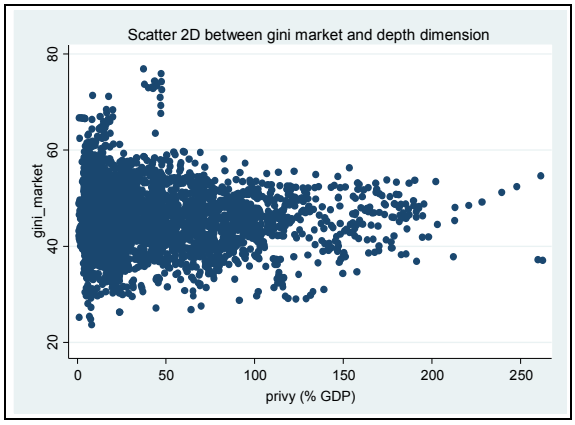

Figure 13: 2D Scatter plot between the gini gross (or gini_market) and the privy. Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.

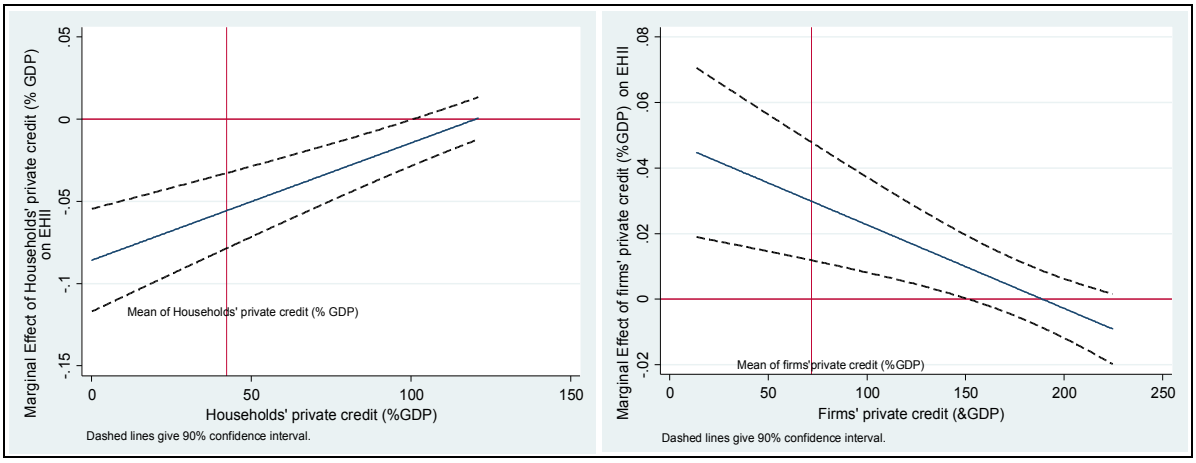

Figure 14: Marginal effects of the disentangled credit on inequality, measured by EHII index. Source: Author's elaboration based on final dataset combining SWIID, WDI and BIS dataset.

Overview of main variables and sources

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

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

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

Overview of control variables and sources

Variable	Definition	Sources
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

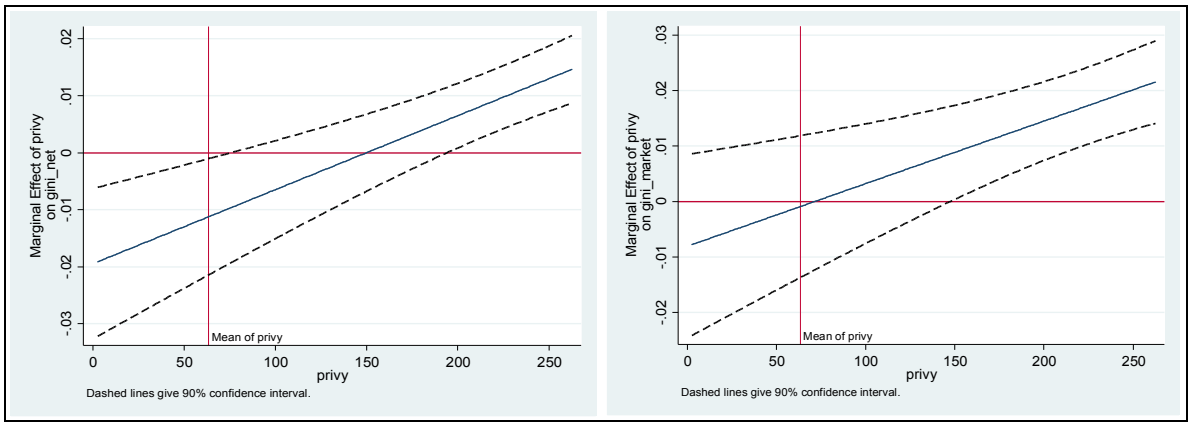

Figure 15: Marginal effects of the (aggregate) private credit on inequality, measured by the net and groos (or market) Gini. Source: Author's elaboration based on final dataset combining SWIID, WDI and GFDD dataset.

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 regression analysis (Fixed effects).

Table 10. Results from fixed effect panel estimation, specification (1), with EHII index as independent variable (1960-2008).

	EHII	*EHII*	*EHII*	*EHII*	*EHII*	*EHII*
	(a)	*(b)*	*(c)*	*(d)*	*(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

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

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.

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

	gini net	*gini net*	*gini net*	*gini net*	*gini net*
	(a)	*(b)*	*(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	
				(0.0028)	
bankprivcredit					0.0127***
					(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

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

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, (1960-2014).

	gini gross	*gini gross*	*gini gross*	*gini gross*	*gini gross*
	(a)	*(b)*	*(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

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

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.

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

	(a)	*(b)*	*(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

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

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

	(a)	*(b)*	*(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***
	(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***			
	(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	
			(0.0164)	
c.stockmktcap#c.servva			-0.000341	
			(0.00025)	
tot_valtraded				0.0724***
				(0.0185)
c.tot_valtraded#c.servva				-0.00095***
				(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

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

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

	(a)	*(b)*	*(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

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

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

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

	gini net	*gini gross*	*EHII*	*gini net*	*gini gross*	*EHII*
L.Y	0.550***	0.541***	0.807***	0.424***	0.607***	0.704***
	(0.0087)	(0.009)	(0.018)	(0.013)	(0.019)	(0.035)
bank_privcredit	0.0367***	0.0157***	0.0137***			
	(0.0013)	(0.0023)	(0.0031)			
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

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

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; 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.

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

	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

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; 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.

Table 19. GMM model specification (2), 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

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; 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.

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

	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_privcredit				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

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; 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 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

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; 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_EHII*	*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

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

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

	log_gini gross	*log_gini gross*	*log_gini gross*	*log_gini gross*	*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
	(0.013)	(0.021)	(0.021)	(0.014)	(0.0184)
log_open	-0.009	-0.0499***	-0.022	0.007	0.0519
	(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
	(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***
	(0.007)	(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		
			(0.009)		
log_stockmktcap				0.005	
				(0.003)	
log_bank_priv					-0.0810**
					(0.035)
log2_bank_priv					0.00626***
					(0.0017)
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

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

Table 24. Results from fixed effect panel estimation, specification (1), with log_ gini net as independent variable (1960-2014).

	log_gini net	*log_gini net*	*log_gini ne*	*log_gini ne*	*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			
		(0.0022)			
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

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

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

	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

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

Table 24. Results from fixed effect panel estimation, specification (3), 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

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

Table 25. 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
log_bank_priv	-0.0910**			
	(0.0437)			
log2_bank_priv	0.00280*			
	(0.0016)			
c.log_bankpriv#c.indva	0.00216**			
	(0.000)			
log_bankdep		0.0172		
		(0.0224)		
c.log_bankdep#c.indva		-0.00173**		
		(0.0006)		
log_stockmktcap			-0.00984	
			(0.014)	
c.log_stockmktcap#c.servva			0.00023	
			(0.0002)	
log_tot_valtrad				-0.00534
				(0.0115)
c.log_tot_valtrad#c.servva				0.00011
				(0.0001)
Number of obs	744	1,124	1,038	1,059
Number of country	92	99	77	77
R-squared	0.254	0.291	0.26	0.244
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Time span	60-14	60-14	60-14	60-14

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

Table 26. 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)
Number of obs	515	779	701	735
Number of country	70	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

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

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

	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

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

"Banking structural reforms and Top income inequality: regulate or deregulate? "

Carola Casti*

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Abstract

This paper investigates how financial deregulation and the banking structural reforms, which took place both in Canada and Italy in the early ninties, might affect the top income shares over time. These banking reforms were passed with the aim to privatise the banking sector and reintroduce the 'quasi universal banking model'. The evaluation of these policy packages is undertaken by implementing a novel approach, the"Synthetic Control Methodology" (SCM). Findings point out a dramatic increase of the top income shares immediately after the banking reforms. This work also aims at disentangling the main potential mechanisms through which banking deregulation might have operated. They have been identified in the higher degree of banking consolidation and concentration over time, in the higher level of income and wealth within the financial sector (firm size effect), in the higher risky profitability of banking activities and in the privatisation process that took place during that time.

Policymakers should take into account this aspect when they implement policies aiming at reshaping the banking and, more in general, the financial industry.

JEL I39, E65, P11, G18, G28.

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1 Introduction

In the last decades, top income inequality has remarkably increased worldwide. This unstoppable trend has gradually started to raise awareness. Not only economists, but also politicians and the public have considerably paid more attention to this topic. Former President, Barack Obama, in his speech at the Center for American Progress in December 2013, described income inequality as the "defining challenge of our time", stating that "dangerous and growing inequality and lack of upward mobility has jeopardized middle-class America's basic bargain". More specifically, the gap between the top income shares and the bottom income shares have dramatically widen, both in the US and in Europe. "An economic system that only delivers for the very top is a failed economic system. If the failures were of a short duration, that would be one thing. But they have been persistent – and there is no evidence of a turnaround" (Stiglitz, 2014, page 387). Indeed, Piketty and Saez (2014) have pointed out, by exploiting tax data, that the share of top income earners has followed a U-trend over time: from the 70's it has been experiencing a dramatic increase worldwide.

Interestingly, some previous works have questioned to what extent the financial sector might be one of the determinants of this unstoppable rise. A possible reason is to be found in the high wages within this sector. Indeed, Bell and Van Reenen (2010) identifies in bankers' bonus and compensation in the US a possible determinant of the high dispersion at the very top of the income distribution. What they conclude is that the class of workers within the financial sector accounts for 60% in the increase of wage inequality. According to their view, three possible explanations might justify the rising pattern in bankers' pay: the economies of '*superstars*'; an increase in the employees' productivity in the financial sector, and last, the moral hazard problem (more in general asymmetric information). Fig. 1.1 describes the pattern of total compensation (bonus + salary) among the managers, both in the financial and other sectors in the US. There is, indeed, a systematic and remarkable difference between them over time, even though this gap has been gradually narrowing.

With respect to the top income earners in Europe, a recent work of Denk (2015) has documented the profile of the top income earners across 18 European Countries, by exploiting the SES (Eurostat Structure of Earnings Survey). He identifies some clear patterns being common to the richest (employees) in Europe: around the 85% of them have a high level of education (tertiary), they are mostly men, between 40 (especially in

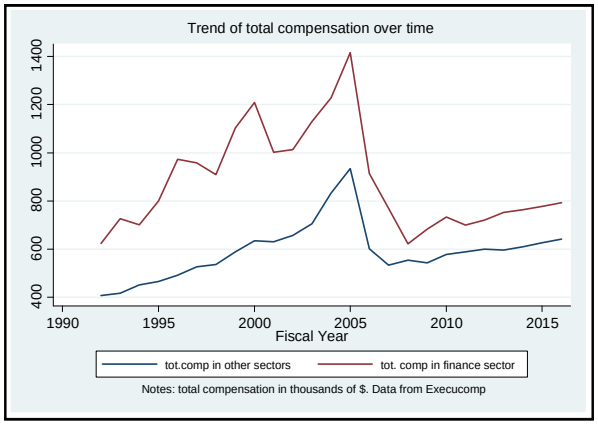

Figure 1.1: Average compensation in financial and non financial sector. Source: Author's elaboration based on Execucomp data.

Central and Eastern countries) and 60 years old; the sector where they mostly operate is in finance/insurance. In line with the Anglo-Saxon data, financial professionals and top executives belong to the top 0.1%, while the non-executive managers and the CEO are most likely to be part of the top 1%. Fig. 1.2 displays the European income distribution according to the sector of employment.

Since financial sector plays a crucial role in shaping the extreme top of income distribution, it is reasonable to investigate to what extent financial reforms, which can alter both the financial industry and financial institutions, may affect its variation.[1] The importance of assessing the impact of these financial reforms on inequality stems from multiple reasons: firstly, to evaluate whether they did or did not exacerbate the level of income inequality by boosting the shares of the top income earners (given their close connection with the financial sector); secondly, surprisingly little is found in the literature regarding the link between financialization and inequality; thirdly, to assess this link might have important policy implications concerning the debate about deregulation of banking and financial market systems.

This work aims at evaluating the effect exerted by two influential banking reforms on the top income shares in Italy and Canada. Indeed, in Italy the most important innovations of "Amato's Law" and "Consolidation Act" (or TUB) have been respectively the gradual privatisation of the banking system and the reintroduction of quasi 'universal banks'. This banking act, aiming at deregulating the financial service sector, encouraged

[1] "Economists underappreciate the potentially enormous impact of financial sector policies on inequality" (Demirgüç-Kunt, A., & Levine, R., 2009, page 3).

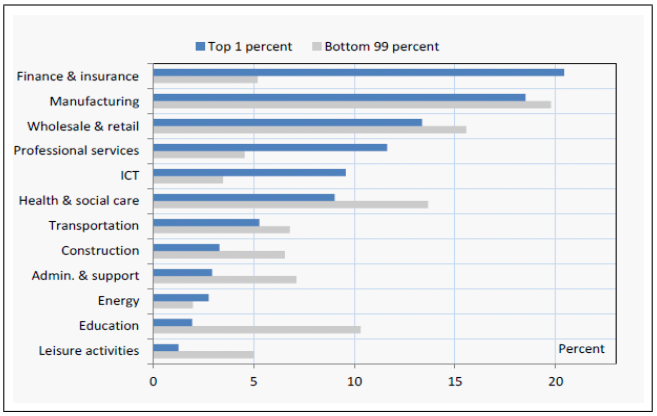

Figure 1.2: Distribution of top 1% and bottom 99% by industry. Source: Oliver Denk (2015)

a higher integration among commercial and investment banks. With respect to Canada, the '*Financial Institution and deposit insurance amendment act*' in 1987, established a gradual shift toward a more unified full service/universal bank model, dismissing the previous 'Four Pillars' system within the financial sector. A novel data-driven approach called "S*ynthetic Control Methodology*" (SCM) is implemented, allowing to create a synthetic control group for each of treated country (Italy and Canada). Findings suggest similar effects of the banking deregulation on the top income shares in both countries: a dramatic increase in the share of the top percentiles has been recorded and the timing of this trend is perfectly in line with the implementation of these policy package.

Moreover, it is crucial to shed light on the potential mechanisms which might be responsible for this effect for a twofold reason: very little has been found in the previous studies and, more importantly, they can be crucial for policymakers to design proper policies aiming at developing more sustainable financial systems. [2] Hence, the additional contribution of this work will be to decompose and close off the possible channels through which the financial deregulation may affect the right tail of the income distribution (this second part will apply to the case of Italy, given the wider amount of data).

By following Tanndal and Waldenström, (2016), I treat the aforementioned banking structural reforms as an exogenous shock. The reason why Italy is used as case study stems from the increasing level of top income inequality among European countries. The OECD report pointed out, already in 2008, that Italy was the 6th country with the highest gap between the poor and the rich. Indeed, the income has become 33% more unequal since the 1980. Furthermore, Italy is sadly well-known because of the

[2] Abadie et al. (2010)

lack of social mobility, which tends to perpetuate inequality over time. Canada, maybe surprisingly, has been experiencing over time an increasing level of top income and top wealth inequality (mainly in the most urbanized areas, as reported by the Chartered Professional Accountants of Canada). From a recent Oxfam report, the two richest Canadians own as much as the 30 deciles of the whole population (around 11 millions of Canadians). In addition, as reported by the Department of Finance, banking sector is one of the Canada's leading employers. The common reform to both these Countries was the (re)introduction of the quasi-'universal banks'.

Very little has been studied with respect to the impact exerted by this kind of financial deregulation on income distribution and, more precisely, top income shares. The supporters of '*universal banking model*' consider the economies of scale, scope and information, with also a higher degree of diversification of financial products (Grande, 2008) as direct consequences of this form of deregulation.[3] Furthermore, the consolidation, which may follow the deregulation, could absorb the capacity in excess within the banking sector, avoiding the negative externalities of bank bankruptcies (which force some banks to exit the market) (Wolgast, 2001). The opponents of this banking model highlight the increasing complexity of banking institutions and the credibility of resolution procedures (Bank for International Settlements, 2006); the conflict of interests and the interdependence within the financial markets, which might exacerbate the domino effects and the stability of the whole economy.

One of the possible consequences of this financial reform might be the increase in speculative activities and riskier investments undertaken with the aim to gain higher returns. Indeed, the pursuit of establishing 'universal banks' might affect badly the quality of financial markets, by favoring OTC markets and shadow banking (Sissoko, 2017).[4] This exposes the banking system to a higher risk and it may even lead to bank failures. Moreover, banking structural change might not only raise a potential conflict of interest (as previously explained) but also some 'lock-in effects' may take place (information monopoly rents). Furthermore, a higher banking consolidation has been observed, both in Italy and in Canada in the post deregulation period. This higher banking concentration may affect the income distribution. Hammond (1957) argued that big banks would disproportionally help the wealthy and the rich and, consequently, the income distribution would widen. Put differently, banks which are too big may also be

[3] See chapter VI from the 'Handbook of financial intermediation and banking', 2008.

[4] The "shadow banking" refers to the praxis of some non-bank financial entities in performing functions of traditional banking. These institutions are also called 'money-like' (although they are not guaranteed by the FED) and they are responsible to have lengthened the credit intermediation chain, making the financial system more vulnerable (Greenwood and Scharfstein, 2012).

'too big for all' and only a few (the rich) can benefit.[5]

The reminder of the paper proceeds as follows. Section 2 discusses the main related literature, in Section 3 a brief description of the reforms, being object of the evaluation in Italy and Canada, is reported. Section 4 describes the methodology and in Section 5 the main results are presented and discussed. To confirm the validity of the findings, in Section 6 the robustness check analysis is performed. Section 7 concludes and a detailed Appendix with additional tables and graphs follows.

2 Literature review

As several mechanisms might determine the link existing between financial deregulation (and more precisely banking structural reforms) and top income inequality, different strands of literature are taken into account: the one dealing with the top income shares and the financial sector; the second one coping with financial deregulation and income inequality; and the strand explaining the potential implications of consolidation in the banking sector.

2.1 Top income shares and financial sector

Finance has been identified as one of the drivers of top income inequality (Bell and Van Reenen, 2010; Kaplan and Rauh, 2007). This stems from multiple reasons, mainly identified in the steady increase of financial sector size over time and also in the number of highly paid employees within this sector (including bonus and compensation). The upward trend in income inequality has been proven to be primarily concentrated at the very top wage income distribution. External push factors - such as deregulation and information technology - have made financial wages much higher given the more complex systems to be managed within the banking industry (De Young and Rice, 2004). According to the Economist (January 2012), 18% of financial professions in the US are part of the 1% top richest: investment bankers, corporate lawyers, and hedge fund/private equity funders are all belonging to this elite.[6] More in details, Kaplan and Rauh (2007) find that managing directors and top-executives employed in the top investment banking firms represent a larger component of the top 0,1%, compared to the executives operating in non-financial firms. Bakija et al. (2012), by exploiting more

[5] Other potential factors for the rise of investment banking power are pension funds (they were responsible to start securities demand, supplied by investment banks); ICT (cut information and operational cost, leading to a higher turnover), (Wójcik, 2011).

[6] "Who exactly are the 1%?" http://www.economist.com/node/21543178

detailed tax data between 1975 and 2005, have estimated that financial professionals, supervisors and executive managers account for roughly 60% of the top 0,1% income earners. They point out the key role played by the financial sector in the change at the top of income distribution: the share accruing to the top 0,1% within the non-financial sector has gradually declined from 36% in 1979 to 31% in 2004, while the one in financial jobs have experienced a dramatic increase, by almost doubling (from 7,7% in 1979 to almost 14% in 2005). Even more interestingly, a high degree of heterogeneity has been depicted across different jobs in their sensitivity of income in presence of business cycles and asset prices. Alvaredo & Pisano (2010) track the rise in the top income inequality in Italy between 1976 and 2004, by exploiting tax data and microdata on the survey of households' income and wealth from the Bank of Italy. They decompose the different sources of income for each of the top income percentile: rents, capital income, business income, wages and self-employment income, concluding that the main drivers of the top income inequality in Italy during those decades have mainly been the wages (especially among the top executives and in the financial sector) and the self-employment income.
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2.2 Financial Reforms and Income inequality

There is an increasing literature (although still very limited) which links together financial reforms and top income inequality. Christopoulos and McAdam (2015) test whether financial reforms may help at stabilizing inequality, by implementing both a panel unit root test and a semi-parametric approach. They take into account a set of reforms occurring in the sample of 29 countries between the 70's and 2005. Their result points out that most of the reforms (excluded those ones dealing with banking supervision) do not stabilize inequality and shocks have permanent effects on it.[7] Furthermore, they deliver some policy recommendations, as countries with a weak redistributive system may experience issues in benefiting from deregulating.

Delis et al. (2012), by implementing a panel VAR methodology, investigate the impact of bank regulatory policies on income inequality (measured in their study by the Gini index). What they come up with is the pro-equality effect of the overall liberalization (despite this does not hold for those economies which are market-based or with poor quality of institutions and economic development). Most interestingly, they stress how the securitization tends to exacerbate the level of inequality.

[7] The set comprehends reforms dealing with credit controls, interest rate controls, entry barriers, banking supervision, privatisation, international capital flows and security markets. They authors use the Abiad et al (2010) dataset.

Beck, Levine, and Levkov (2007) investigate the impact exerted by the interstate and intrastate branch deregulation on income distribution, occurring in the USA between the 70's and the 90's. They conclude that the intrastate branch deregulation tightened the income distribution, by favoring the low percentiles (until the 40th). However, it did not seem to affect the top income percentile, as it was a reform aiming mainly at operating on the extensive margin of finance (accessibility), rather than on the intensive one (quality improvement of financial services and returns for incumbents already involved in the financial market).

The latter margin is indirectly studied by Tanndal and Waldenström (2016), in assessing the impact of financial deregulation policies on the top income earners, by implementing the novel synthetic control methodology (SCM), developed by Abedie et al. (2010). More in details, they study the main financial reforms in UK and Japan, called the 'Big Bang' reforms, by focusing on the right tail of the income distribution and disentangling the effect on the different percentiles of the top 10% to capture the high heterogeneity. In doing so, they are able to identify and isolate who benefit the most, among the rich, from the deregulation. What they stress is the different impact exerted by financial deregulation reforms on the top income earners: while in Japan the main gains were spread among the white collars in the financial sector; in the UK the upper half of the top earners dragged the increase in the share, suggesting that it has been much more concentrated at the top.

2.3 Consolidation in the banking sector

There has been an extensive literature in consolidation within the banking sector, despite it is extremely limited when linked to inequality. Indeed, the effects exerted by mergers and banking consolidation (which might follow after deregulation of this type) might effect both the intensive and the extensive margin.[8] With respect to the potential impact on the top income earners, after the consolidation, the *firm size effect* might operate, by boosting the top shares and increase the monopoly power of these banking institutions. However, this higher concentration could also operate on the extensive margin and on the bottom/middle income shares. Indeed, there is some empirical evidence that consolidation within the banking sector might affect the rest of the income distribution. It crucially depends on the number of alternatives available to borrowers -which are more constrained and cut off, the more they lack collateral- (Sapienza, 2002). Similarly, Bertrand et al. (2007), investigate the effect of financial deregulation in France

[8] See Berger et al. (1999) for a thorough explanation on the causal link between financial deregulationa and consolidation.

in 1984-1985 on an extensive group of firms. The worst performing ones tend to face a higher cost of capital and to be excluded from the loan market.

Hence, since this kind of deregulation favour consolidation and mergers among commercial an investment banks, it may also change the extensive margin of finance. A potential two-fold effect on the bottom income earners, along the latter margin might operate: on the one hand, consolidation might better off borrowers, by extending the range of financial products available to them (intensive margin) but also widening the extensive margin, making easier and less costly for a higher number of clients to get a loan (given the higher level of competition that might arise due to financial deregulation); on the other hand, borrowers are more exposed to the risk and to speculative behaviour and tend to buy those financial products which might not be appropriate for their risk profile.[9] Besides, big banks might also prefer lending to already 'wealth' borrowers and, consequently, widening the income gap.

3 Individual Case studies

3.1 Canada: "Financial Institution and Deposit insurance amendment act" (1987)

The '*Financial Institution and deposit insurance amendment act*', is one of the most important financial reforms occurred in Canada. This Act has been considered as the Canadian equivalent of the 'Financial Modernisation Act' in the US in 1999.[10] Before 1987, the Canadian financial system was based on the so-called 'four pillars', with a separation among Chartered Banks (Credit Unions), Trust/Mortgage Loan companies, Insurance companies and Investment Intermediaries. After this Amendment Act, which allowed chartered banks to consolidate with (investment) banking subsidiaries, there has been a gradual shift toward a more unified full service/universal bank model. Indeed, the banking system has been remarkably concentrated, with the largest six banks accounting

[9] Bertola et al. (2006) claim how the financial liberalization, occurring in Italy, increased the level of competition and, consequently, lowered the households' cost of borrowing, expanding the demand for loans. Indeed, the number of branches (considered as a proxy of the accessibility to the banking sector) has considerably increased from 16,000 to 30,000 (over the time span 1990-2003). However, during the same period, in support of the massive consolidation that took place, the number of banks has been decreasing since then.

[10] It repealed the 'Glass-Steagall Act'. This act was a previous reform which had separated commercial and investment banks since 1933, by strictly regulating the banking system with the aim to protect depositors, limit speculation activities and remove the 'conflict of interest' (potentially existing within those banks engaged in both lending and underwriting).

for more than 90% of Canada's total banking assets (Hyman et al., 2015).[11] This banking model is called 'British-style universal banking system' and it's common to Countries such as UK, US and Australia. It allows banks to engage in securities underwriting.[12]

3.2 Italy: "Legge Amato" and "Banking Act" (1990-1993)

This particular package of financial reforms included the so-called "Amato Law" (or Privatisation Law) in 1990 and the Legislative Decree n. 385/1993 (called TUB or "Consolidation Act").[13] They repealed the 'Banking Law', an act previously enacted during fascist dictatorship, which had separated commercial and investment banks since 1936, by strictly regulating the banking system with the aim to nationalize it and exploit it to serve government'purposes. Furthermore, this previous Act classified the different types of banks which, though, were all state-owned. One of the major changes which the "Amato Law" and the TUB led to, was the gradual privatization of the banking system (or at least a coexistence of state owned and private banks), the abolition of branches restrictions but the most remarkable innovation was the reintroduction of quasi-'universal banks' (Section 10). [14] The reforms also set specific provisions about bank's ownership in order to pose limits to the shares of banks that could be owned by industrial companies, without completely prohibiting these participations (Sections 19-24).[15] Eventually three different types of banks were created: ordinary banks with the legal form of corporations and two different kinds of banks chartered as cooperatives ('banche popolari' and 'banche di credito cooperativo'). They were allowed, because of this reform, to own subsidiaries involved in different financial activities. In other words, this particular

[11] https://www.fin.gc.ca/toc/2002/bank_-eng.asp

[12] There are though some differences in comparison to the pure German universal bank system (Miskhin, 2007). Indeed, while bank equity holdings of commercial firms and merges among banking and insurance firms are less common in , the opposite holds with separate legal subsidiaries, most likely to take place in the British banking universal model.

[13] The first attempt of this work to evaluate the effect of banking reform on top income shares has involved the 'Financial Modernization Act', occurred in the USA in 1999, which repealled the 'Glass-Steagall Act' of 1933 and which allowed commercial and investment banks to merge. However, since years before the reform, many mergers had already started to take place among american banks, the SCM did not appear to be the most appropriate methodology to analyze these effects.

[14] The form of universal bank as alternative banking structure has been partly anticipated by the II Banking Directive of 1989, which defined it as a model for the European banking industry.

[15] In 1998 the *'Consolidated Act on Financial Intermediation (TUF)'* passed (in adoption of the European Directive n. 22/93). This act expanded further the range of banks' activities, which could have undertaken investment services, beyond the traditional ones. Our analysis has not focused on this reform, since the reform package of 1990-1993 has been crucial to deeply change the banking structure. However, the TUF might have increased even further the profit margins and empowered the speculative channel.

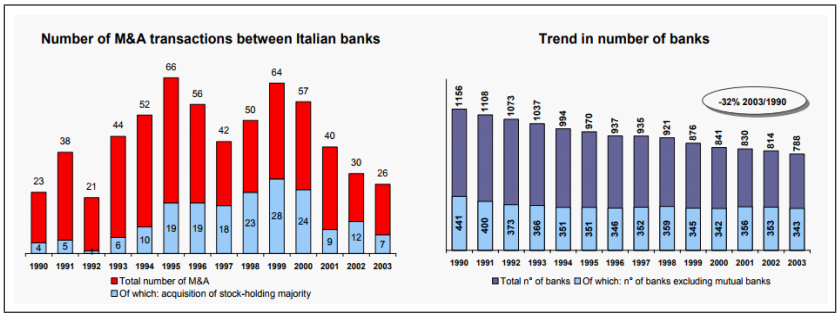
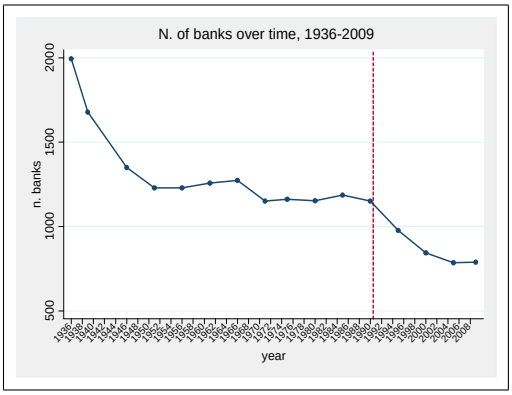


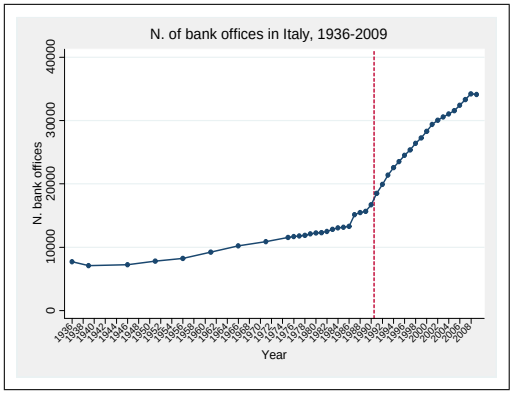
Figure 3.1: Trend in consolidation between 1990 and 2003. Source: Coletti and Crorona, Banca Intesa report 2004, Bank of Italy data.

intervention, aimed at deregulating the financial service sector, encouraged a higher integration among commercial and investment banks. As a consequence, the banking system has become much more concentrated over time.[16] The M&As undertaken between 1990 and 2000 involved more than 46% of the Italian banking system (Messori, 2001). The amount of banks fell by 28% between 1990 and 2002 and by 37,5% by extending the period till 2012, but the level of banking assets increased significantly (even though in some countries, such as US, this trend has become much more remarkable). The top five largest banks hold over half of the Italian banking industry's assets, and the top three over the 40% of total assets. One third of the operative banks in 1990 no longer exists (Coletti and Corona, 2004). Moreover, changes in competition, following deregulation, may affect firms' profits, the bargaining power and the incentives for executives to extract rents from the companies (Bebchuck et al., 2002).

In addition, the Fig. 3.2 displays the number of banks and the number of bank branches respectively over time. What can be observed is a gradual decrease of the number of financial institutions and even a sharper decline around the banking deregulation, given the higher degree of banking consolidation. At the same time, though, a higher level of banking competition has been documented with an sharp increase in the number of bank branches.

[16] See Hagendorff et al. (2007) on the link between financial deregulation in banking sector and consolidation acitivities.





Furthermore, this kind of structural policies might affect the banking income margins and their composition. As shown in Fig. 3.3, the growth of income margins within the banking sector, namely interest and non interest income, has followed a different pattern over the years. Indeed, while during the 80's, the growth rate of the margins experienced in the traditional banking activities was much higher than the non-interest income growth, in the 90's the trend was reversed. This new pattern may validate the effect exerted by the banking structural deregulation with respect to financial institutions and the credit market. The increase of the non-interest income might reflect the shift of the banking sector to more capital-oriented activities (such as asset management, underwriting, advisory services and trading). One of the possible reason of this shift has been identified by Hackethal and Schmidt (2005) in the rise of big investment banks, and consequently, in a new and more profitable (speculative) range of activities.

4 Methodology

4.1 Synthetic Control Methodology

The methodology implemented to evaluate the impact exerted by the banking deregulation on the top income earners is the Synthetic control methodology (SCM), developed by Abadie et al. (2003, 2010).[17]

This data-driven novel approach allows for creating a more reliable control group, called '*synthetic*', resulting from a weighted average of a pool of control countries, similar in their covariates to the treated country in the period pre-reform. In this way, it is possible to evaluate the effect that deregulation would have had on all the top income

[17] "Arguably the most important innovation in the evaluation literature in the last fifteen years is the synthetic control method [...] this method builds on DD estimation, but uses arguably more attractive comparisons to get causal effects" -Susan Athey and Guido Imbens (2017, page 9).

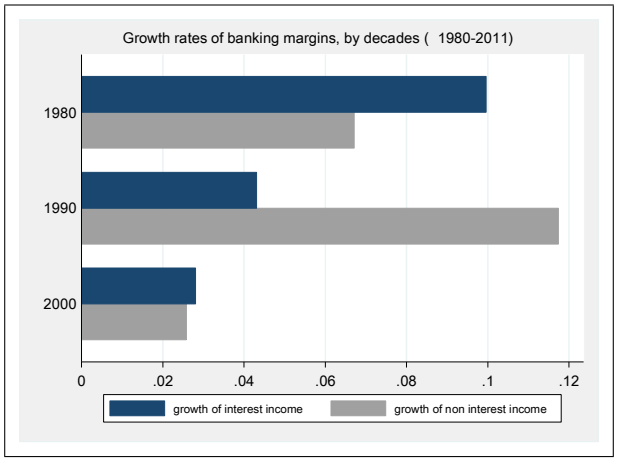


Figure 3.2: The graph illustrates the dynamic of income margins within the banking sector over the decades. In the 90's the growth rate of non-interest income has been dramatically higher than the one concerning the more traditional activities of banks. Source: Author's elaboration based on OECD data.

earners (outcome variable), if the reform had not occurred, by simply comparing the actual data of the treated country with the synthetic control. The difference between them is called '*treatment effect*' and is nothing but the effect that the reform has exerted on the outcome variable.

This is a novel methodology which allows for time-varying individual-specific heterogeneity and help at reducing potential endogeneity as a result of omitted variables. It selects the control unit according to a specific weight, chosen on the similarities of the covariates. Hence, the researcher has got much less discretion in picking the control group. In addition, the SCM takes into account the heterogeneity of the effects of the reform (that are averaged in the DID set up, implying an homogeneous effect of the reform on the outcome variable). Last but not least, this novel approach reduces the potential endogeneity due to omitted variables. Indeed, only countries which are similar in their observable and unobservable factors would be part of the control group. In this section this novel methodology will be explained in order to get the main insights and to clarify why it is the most appropriate for the purpose of this analysis. [18] A crucial assumption of this method lies in the absence of interferences among units (Rosembaum, 2007).

Let's assume to have i countries, where $i = 1, ...j + 1$ is the treated unit, while $j =$

[18] For a more thorough explanation of the syntehtic control methodology, the reader is referred to Abadie et al. (2003, 2010).

$2, ...J+1$ are the donor countries (in this case represented by the OECD economies).[19] By following Abadie et al. (2010), Y_{1t}^N is the unobservable outcome in country unit $i = 1$,(Italy and Canada in this case) at time of the intervention T_0, should the reform (considered as an exogenous shock) not be implemented. We define $t = 1, ...T_0$ the pre-intervention period, while the interval between T_0 and T is the post-intervention period where the treatment effect is observed. Y_{1t}^I is the actual value of the outcome variable being affected by the intervention if $t \geqq T_0$. In the pre-intervention period we assume that $Y_{1t}^N = Y_{1t}^I$ must hold. The effect of the intervention on the treated unit $i = j+1$, is $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$. However, to measure α_{1t} the counterfactual is required. In general, it must hold that:

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it}$$

$$\text{with } D_{it} \begin{cases} =1 \text{ if } i{=}j{+}1 \text{ \& } t{>}T_0 \\ =0 \text{ otherwise} \end{cases}$$

If $i = j+1$ and $t > T_0$, it follows that:

$$\alpha_{1t} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N$$

Y_{1t}^N needs to be estimated, since it is not observable. It can be assumed that it depends on a set of observable and unobservable factors:

$$Y_{1t}^N = \delta_t + \theta_t Z_1 + \lambda_t \mu_1 + \varepsilon_{1t} \tag{4.1}$$

where δ_t are the time-fixed effects, θ_t is a $(1 \times r)$ vector of unknown parameters, $Z_1$is a $(r \times 1)$ vector of observable covariates not affected by the intervention; λ_t is a $(1 \times F)$ vector of unknown parameters and μ_1 is a $(F \times 1)$ vector of unobserved factor loadings. For the (1) to hold, it is required to assume that this set of variables affects the outcome variables of the donor countries in the same time span before the intervention. Hence, it is possible to replicate the outcome variable's trend of the treated region as a weighted average of donor countries, selected on the basis of their similar covariates (observable and unobservable). Indeed, this methodology is effective in dealing with omitted variables bias. These weights are represented by a $(J \times 1)$ vector $w = \{w_{2,}...w_{j+1}\}'$, such that $w_j \geqslant 0$ for $j = 2, ...J+1$ and $\sum_{j=2}^{J+1} w_j = 1$. The value of this

[19] In the SCM is suggested to include as pool of potential donors those countires similar in the stage of economic development, culture and geography proximity. Hence, the choice of OECD countries as donor countries is justified by this primary reason (see Tanndal and Waldenström, 2016) and also by the availablity of data for longer horizons and for a wide range of predictors.

vector coincides with a specific control group (aiming at replicating the treated group in the period pre-intervention). It is then possible to estimate:

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \delta_t + \theta_t \sum_{j=2}^{J+1} w_j Z_1 + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{jt} \tag{4.2}$$

where $\sum_{j=2}^{J+1} w_j Y_{jt} = Y_{it}^N$. Hence, $\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$ for $t \in \{T_0 + 1, ...T\}$,which is the estimate of the treatment effect.[20]

4.2 Data

By following Tanndal and Waldenström, (2016), as reported in Table 4.1, to exploit the heterogeneity within the top 10 percentile of the right tale of income distribution, the top income shares for each top percentiles are selected from the Wealth and Income dataset (WID), that is the top 10, 5, 1 and 0,1 top percentile. The countries being part of the synthetic control group are the following OECD economies: Australia, Denmark, Finland, France, Germany, Ireland, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland.[21] Table 4.2 lists the predictors that might affect the top income inequality. The major determinants of the top income inequality might be related to several channels: first of all, the tax rates for the top income earners (there has been a gradual cut in the top tax rates over time in several advanced countries); the tertiary enrollment, provided that many top income earners working in the financial sector are highly educated (Denk, 2017; Levine and Rubinstein, 2013); the level of protection of employers and the power of labour unions; the level of capitalization of the stock markets, as many of the top income earners own a considerable amount of their wealth in the form of stocks and all these economies rely on well-developed financial markets (Atkinson, 2007); the legal origin since the synthetic control group should be as close as possible to the treated unit. For the same reason, also the growth of the GDP and the level of economic development are included as predictors (Abadie et al., 2007). Furthermore, provided the close link between the right wing and capitalism, also the political party during the pre-intervention period is included: the idea behind is that

[20] the optimal weights are found such that: $\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11}$ and $\sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0}$

[21] Not all the OECD economies are included due to the missing values, which prevent the synthetic control methodology to be used. Furthermore, countries like US and UK are not part of the control group since they experienced similar exogenous shocks during the same period or even earlier, which make them unsuitable to replicate the trend in tre pre-event window.

Table 4.1: Overview of the main variables

Control	Description	Source
Top 1P	Share Top 10 percentile	WID (Wealth and Income dataset)
Top 5P	Share Top 5 percentile	WID (Wealth and Income dataset)
Top 1P	Share Top 1 percentile	WID (Wealth and Income dataset)
Top 0.1P	Share Top 0,1 percentile	WID (Wealth and Income dataset)

Table 4.2: Overview of the baseline predictors

Control	Description	Source
growth	annual GDP growth rate%	WDI
GDPPcons	GDP per capita ($ constant)	WDI
rightwing	right wing executives	DPI
capitquinn	Quinn index	Quinn 1997
epl	protection legislation of employment	Nickell, 2006
enroll_tert	% of tertiary enrollement	WDI
Top tax rate	Top marginal tax on income	Piketty et al. 2014
civ_law	civil law	La Porta, 1997
french_law	French legal origin	La Porta, 1998
stckmktcap	stock market capitalization (GDP)	Beck, Kunt, Levine (2010)

financial deregulation might be favoured by certain parties due to personal interests (Keller and Kelley, 2015).

5 Results

5.1 Canada

In this section the preliminary results on the impact of each of these financial reforms on the top income shares are reported. As shown by Fig. 6, the case of Canada is first provided, being the time of the financial reform set in 1987. Before the event period the fit between the actual and the synthetic Canada is well replicated (especially in the case of the Top1P and the Top 0.1P. Overall, a systematic difference ('treatment effect') between the Top income shares (1P, 5P , 10P and 0,1P) of the treated Country and its synthetic control group can be depicted. Only when the Top 10P is used as outcome variable the difference between the two trends becomes evident later than the 1987 (approximately around 1989). This might be linked to the wide heterogeneity within the broader 10% of the richest population and its different composition within the synthetic control group. Hence, this heterogeneity might be harder to capture and replicate in the

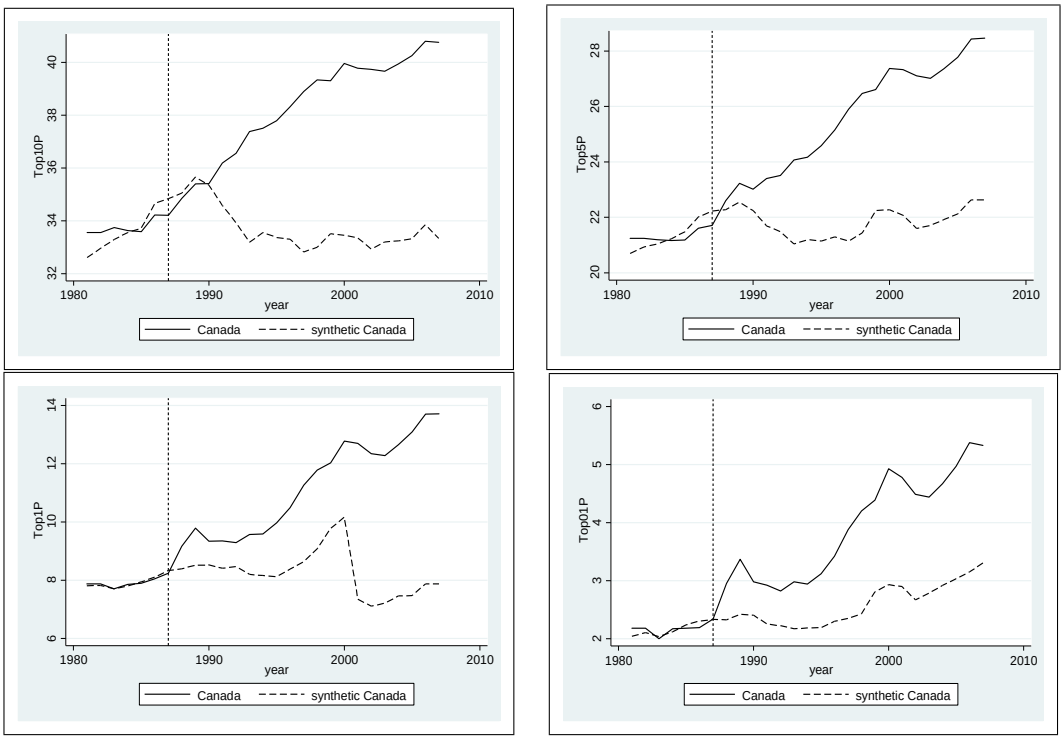


Figure 5.1: SCM Canada: Notes: For each top income share, a synthetic control group (dashed line) is calibrated to match the true trend (solid line) prior to treatment. The trend of the synthetic control represents the trend in Canada in absence of the 'Financial Institution and deposit insurance amendment act', and the difference between the two lines is the effect of financial deregulation on the top income share

synthetic control, compared to the other income shares (in fact a higher proportion of non-financial professionals belong to this percentile and the income sources may vary a lot across the Countries in the sample). Furthermore, it may be less responsive to an exogenous financial shock, such as a deregulation reform.

Fig. 5.2 highlights the goodness of the pre-intervention fit for each outcome variable (Top 10P, Top 5P, Top 1P and Top 0,1P). In the pre-intervention period, indeed, the percentage gap should be as close as possible to 0, suggesting the lack of difference between the synthetic group and the treated unit.[22] At a deeper analysis, the worst fit is experienced by the Top 10P, even though the percentage gap in the pre-reform

[22] In SCM studied it is important to have a good fit for a reasonable long pre-intervention period, eventhough in the literature there is not a clear indication on how long it should be. In the case of Canada only data up to 8 years before the intervention were available. However, given the well performing robustness check and almost a decade as pre-period fit, results and the estimation process can be considered validated and reliable.

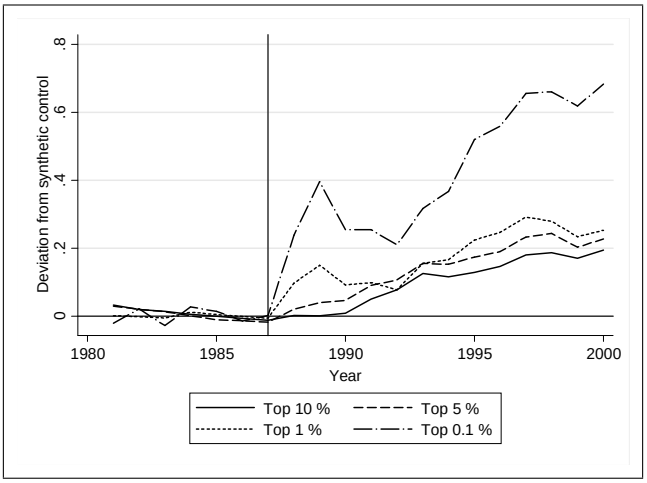


Figure 5.2: SCM Canada: Percentage gap deviation of each outcome variables from the synthetic control group.

period is still very limited and close to 0. After the intervention time, 1987, year of the implementation of the Banking Act, there is a remarkable difference in the percentage gap, which increases considerably over time.

5.2 Italy

The preliminary results of synthetic control methodology applied to Italy are reported. As it is shown, the synthetic control group replicates quite well the 'treated' Italy. However, in some cases the treatment effect (gap between the solid and the dashed line) appears to start one year before the event (financial reform), to suggest that there might have occurred some anticipatory effects before the 'Banking Act' was officially passed. What is relevant is the different trend between the two lines, suggesting that the implementation of banking reforms (aiming at deregulating the sector) affected the top income shares. The worst fit is recorded when the Top 0,1P is the outcome variable.

With respect to the Fig.5.2, the percentage deviation gap performs overall well, floating around 0, but relatively worse than the case of Canada. Nonetheless, after the intervention, an increase of this gap is evident, for all the outcome variables.

5.3 Analysis of the mechanisms.

Given the complexity and the multiple implications which may arise as direct and indirect consequences of financial deregulation, several channels (yet, not independent from each

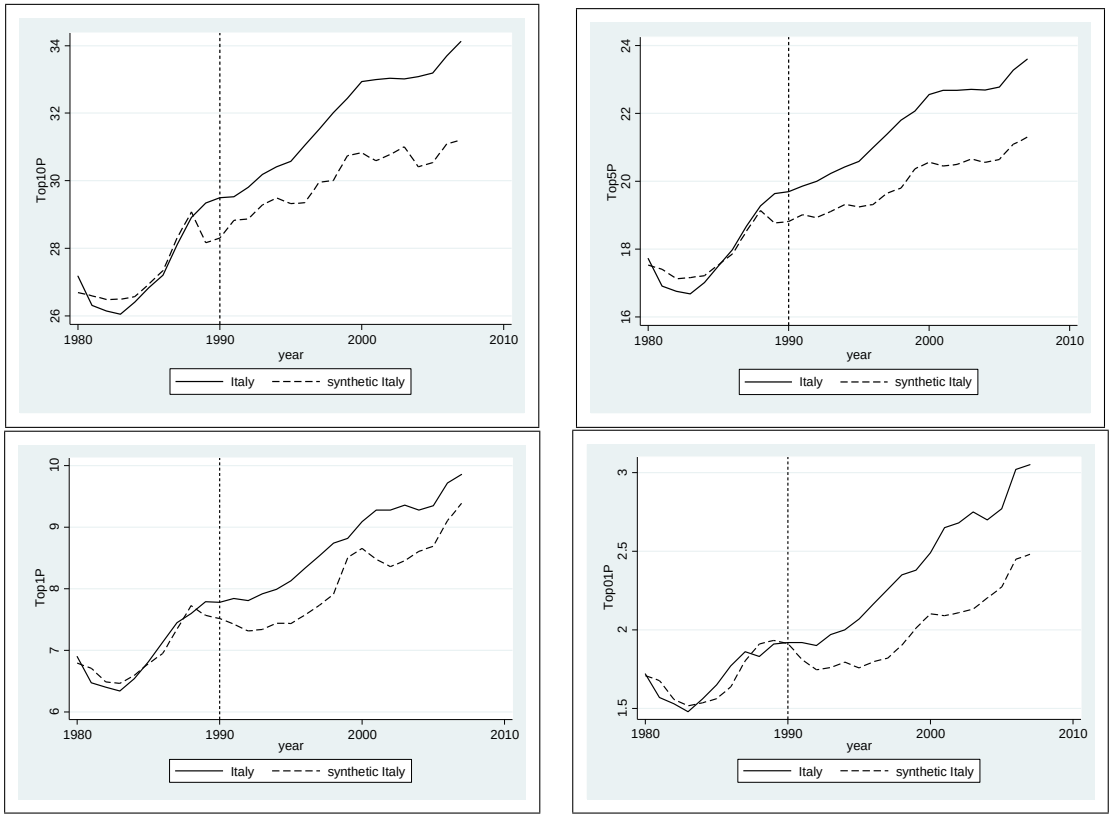


Figure 5.3: SCM Italy: Notes: For each top income share, a synthetic control group (dashed line) is calibrated to match the true trend (solid line) prior to treatment. The trend of the synthetic control represents the trend in Italy in absence of the 'Legge Amato' and 'TUB', and the difference between the two lines is the effect of financial deregulation on the top income share.

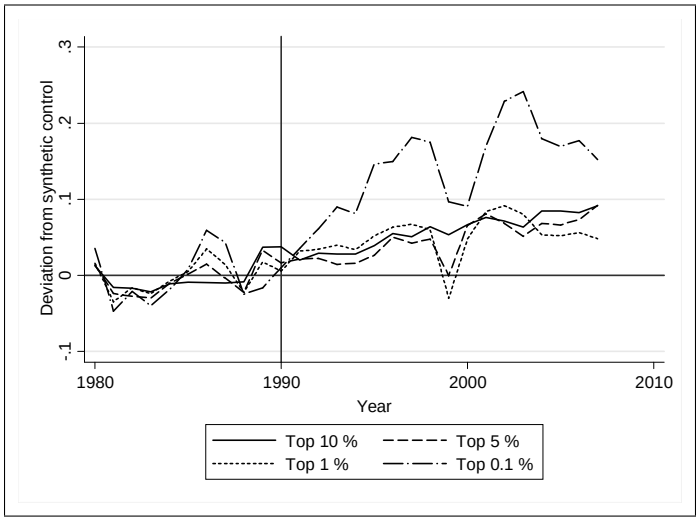


Figure 5.4: SCM Italy: Percentage gap deviation of each outcome variables from the synthetic control group.

others) are identified as potential drivers of change in top income shares, should financial deregulation (in this case banking structural reforms) take place:

- Different sized-banks (post-consolidation) tend to lend to different classes of borrowers (e.g. big banks tend to lend to big firms by mostly relying on 'hard' information, disregarding the small and medium enterprises), Grande (2008), ch. IV;[23]

- Stock market prices: the consolidation may affect the rate of return and boost the income of the top 1 percentile, as they own a big proportion of financial wealth (Greenwood and Jovanovic, 1990; Atkinson, 2007);

- Firm size effect: higher earnings and executive pay for those financial sector employees already highly remunerated (the size of firms and industry concentration may boost the remuneration of employees and managers across different sectors and even more within the financial sector), (Tanndal and Waldenström, 2016; Kaplan and Rauh, 2010; Bell and Van Reenen, 2010; Philippon and Reshef, 2012); moreover, the presence of agency problems and high levels of market power may lead to asymmetric payoffs for managers within the banking sector (Korinek and Kreamer, 2014);

[23] Thakor, A. V., & Boot, A. (Eds.). (2008). "Handbook of financial intermediation and banking". Elsevier.

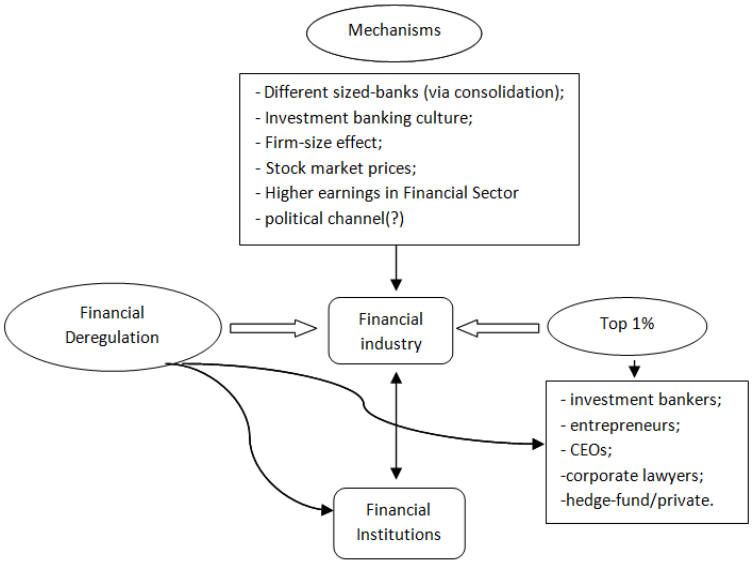


Figure 5.5: Potential mechanisms via which financial deregulation and structural banking reforms might operate and affect the income distribution.

- The spread of investment banking culture (post-consolidation) into commercial banks - traders and investment bankers often have become the new executives of the commercial banks after consolidation - (Megginson, 1994; Wójcik, 2012).

- The switch from more traditional banking activities to non interest banking margins involving nontraditional activities - as a result of a deep change in the legal framework, primarily involving brokerage, insurance agency, investment banking and mutual fund sales - (Hackethal & Schmidt, 2005). The consolidation might have played a crucial role in determining this structural change related to banking activities. 'By some measures, non-interest income might be characterized as a large-bank phenomenon.' (De Young and Rice, 2004, pg 41).

As far as we know, this is the first work which attempts to disentangle the multiple channels through which banking deregulation might affect the right tale of the income distribution. For each of the potential mechanisms some proxies have been identified and the aim of this second part of the paper is to test them empirically. Hence, to shed light on these potential transmission channels can have important and relevant implications for policy makers, who want to design suitable financial reforms which do not favour only the elìte (the most powerful and the richest groups).

From the policy standpoint, identifying the main mechanisms that affect top inequality, and more in general income distribution, is crucial to design appropriate financial policies aiming not only at ensuring financial stability, but also enhancing a more egalitarian distribution of income.

5.3.1 Empirical analysis of the transmission channels.

Given the insufficient and not comprehensive amount of data for the case of Canada, this analysis applies only to Italy. Some proxies for the channels have been identified to represent as close as possible the mechanisms which might explain the percentage gap deviation between the treated unit and the synthetic control group (which is the financial reform effect). Since a considerable increase in mergers and acquisitions after the 90's has been reported, which might be related to the different size bank channel, a proxy for the consolidation within the banking sector is employed (*concen*).[24] Indeed, monopolies tend to exert a major and positive impact on the very wealthy agents (Comanor & Smiley, 1975) The second main channel that may explain the effect of the reform is the privatisation process (*privatisation*), for which the index from the Financial reform dataset (Abiad, 2010) is included. To represent both the firm-size effect channel and the higher level of compensation within specific sectors that might have followed the reform, the average compensation within the financial sector *(incomeFin* and *wealthFin*) has been implemented as a proxy.[25] Provided that the top income earners own a considerable amount of financial wealth, a proxy that take into account the size and the average return of the market is needed. Hence the share price index (*stock_price*) is included in the analysis.[26] Furthermore, a measure of bank profitability is employed, the 'return on assets' (*roa*), to check whether the profitability margins in the banking sector can explain the treatment effect of the financial reform. [27] Since the net non interest bank margins have dramatically increased around the time of the deregulation (see Fig. 3.3), it is also worth to investigate whether this might be a potential mechanism through which the banking deregulation has increased the top income shares via more speculation oriented

[24] To create the concentration proxy for post-event period, the index created by Beck et al. (2000), from 1988 until 1997 and the 'Financial structure database' (2013), with data from 1998 up to 2014 have been used. The result is a consistent time series with data on consolidation sector. As robustness, also the CR-5 largest banks and the boone indicator (from the ECB) have been used.

[25] See 'Household Income and Wealth', a survey provided by the Bank of Italy. The series of average income has been calculating by averaging in each year the salaries within the financial sector (settp11=6).

[26] The data are available in OECD website: https://data.oecd.org/price/share-prices.htm

[27] The spread (lending - deposit rate) is also used as proxy for the degree of competition within the banking sector. Higher levels of spread indicate less competition.

Table 5.1: Overview of the potential channels explaining the effect of the financial reform in Italy.

Channel	Description	Source
concen	concentration measure in banking sector	Beck et a. (2000), (2013)
incomeFin	avg income in financial sector	Bank of Italy
wealthFin	avg wealth in financial sector	Bank of Italy
roa	return on assets	Beck et al (2013)
NIM	non interest banking margins	OECD
stock_price	price shares	OECD
privatisation	index of privatisation	Abiad (2010)

activities (*NIM, Non interest margin*).[28] Finally, since the transmission mechanisms of a policy have been evaluating, it is also important to take into consideration the political channel (the effect of the deregulation might be reinforced also through the political connections of the wealthiest elites). The proxy for this last mechanism is *rightwing.* [29] It may be then useful to check whether some patterns arise by looking at the scatter plot for each of these proxies and the different gaps (treatment effects). Needlessly to say, this section is a pure exploratory study keen to analyse the degree of correlation among variables. We report, for brevity, only the scatters that depict a clear pattern among these potential channels.

[28] We refer to 'interest bank margins' as the traditional banking activities (granting loans, receiving deposits); the 'non interest banking margins' activities include cash management, bank account management and other off-balance sheet sertvices.

[29] The empirical approach relies on a simple WLS regression (accounting foe uncertainty in the estimates), treating the percentage deviation gap (for each top income shares) as dependent variable (Y_t) and the aformentioned proxies as independent variables (X_t).

$$Y_t = \alpha_t + \beta_t X_t + \varepsilon_t$$

Results are available upon request. However, given the limited amount of observations for some proxies, they have to be treated with caution and that is the main reason why in the paper only a graph analysis has been reported and discussed.

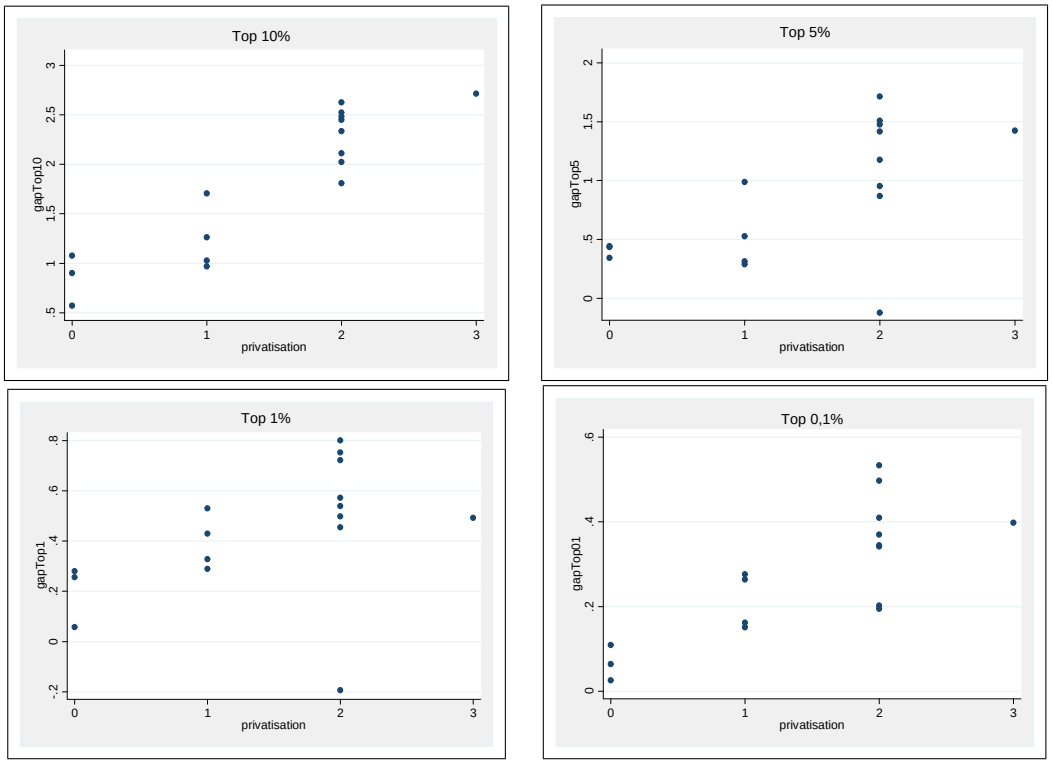


Figure 5.6: Scatter plot of the treatment effect 'gap Top' shares and provatisation index. Notes. The privatisation index (Abiad , 2010) ranges from 0 (no privatisation) to 3 (fully privatisation)

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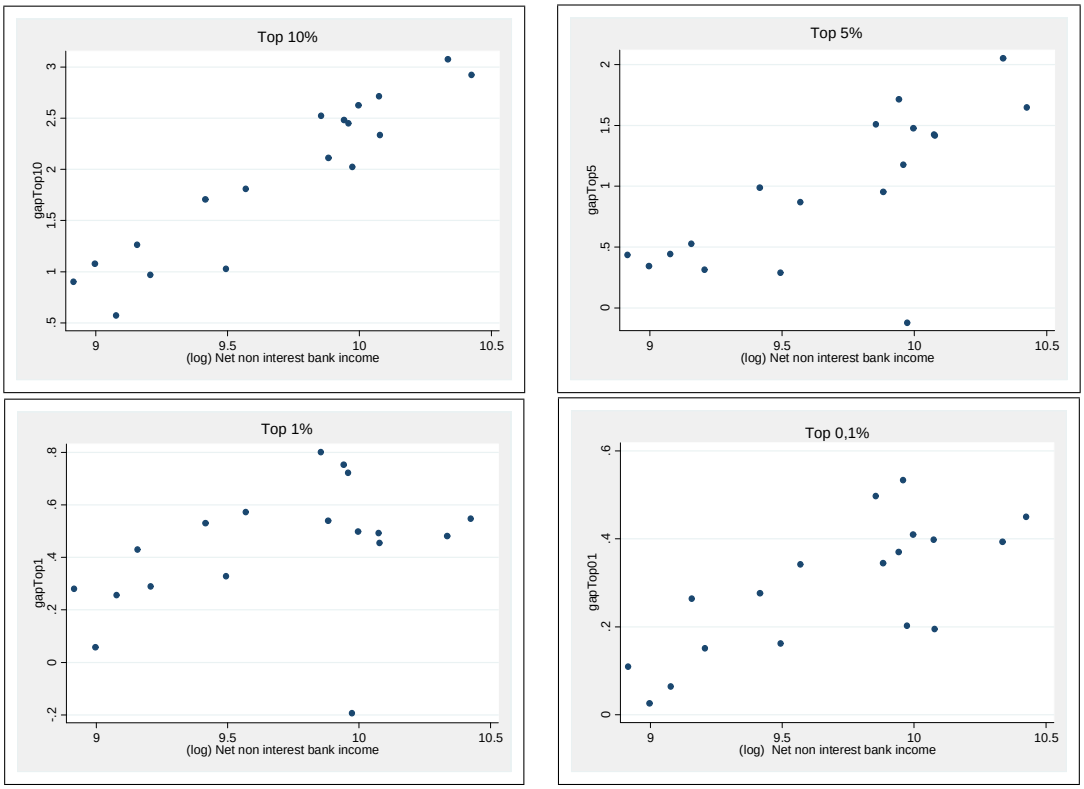

Figure 5.7: Scatter plot of the treatment effect 'gap Top' shares and non interest banking margins

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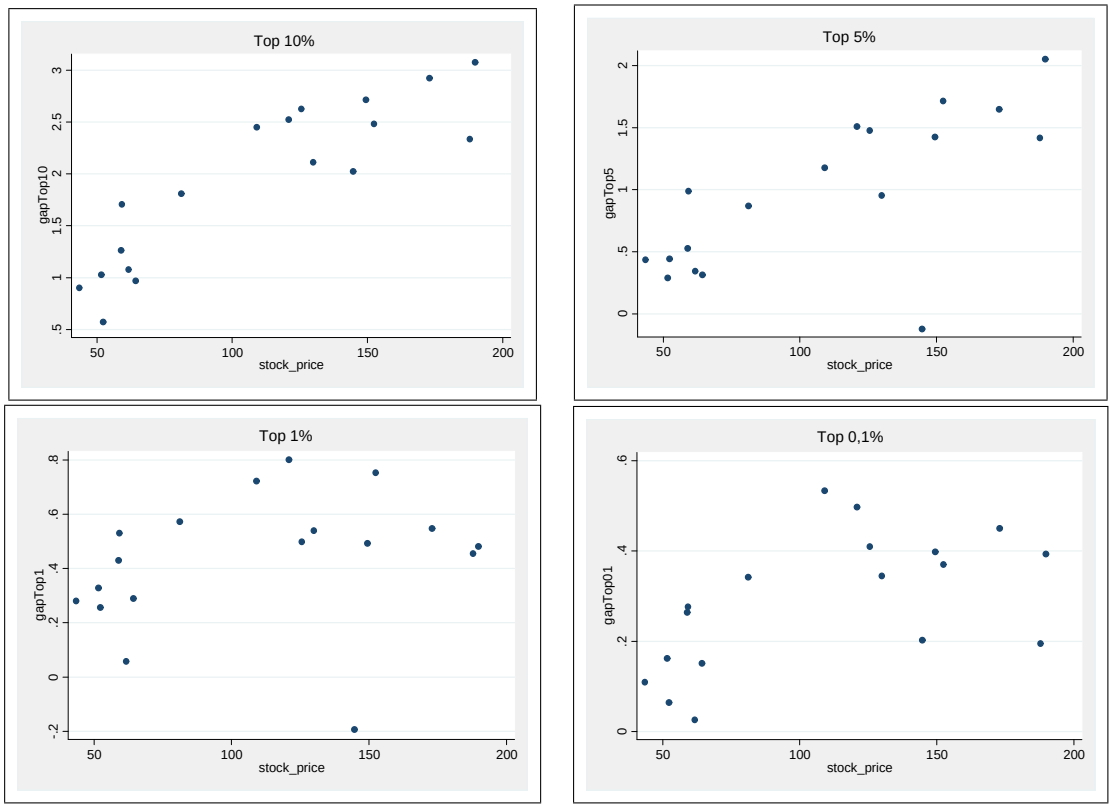

Figure 5.8: Scatter plot of the treatment effect 'gap Top' shares andstock price index

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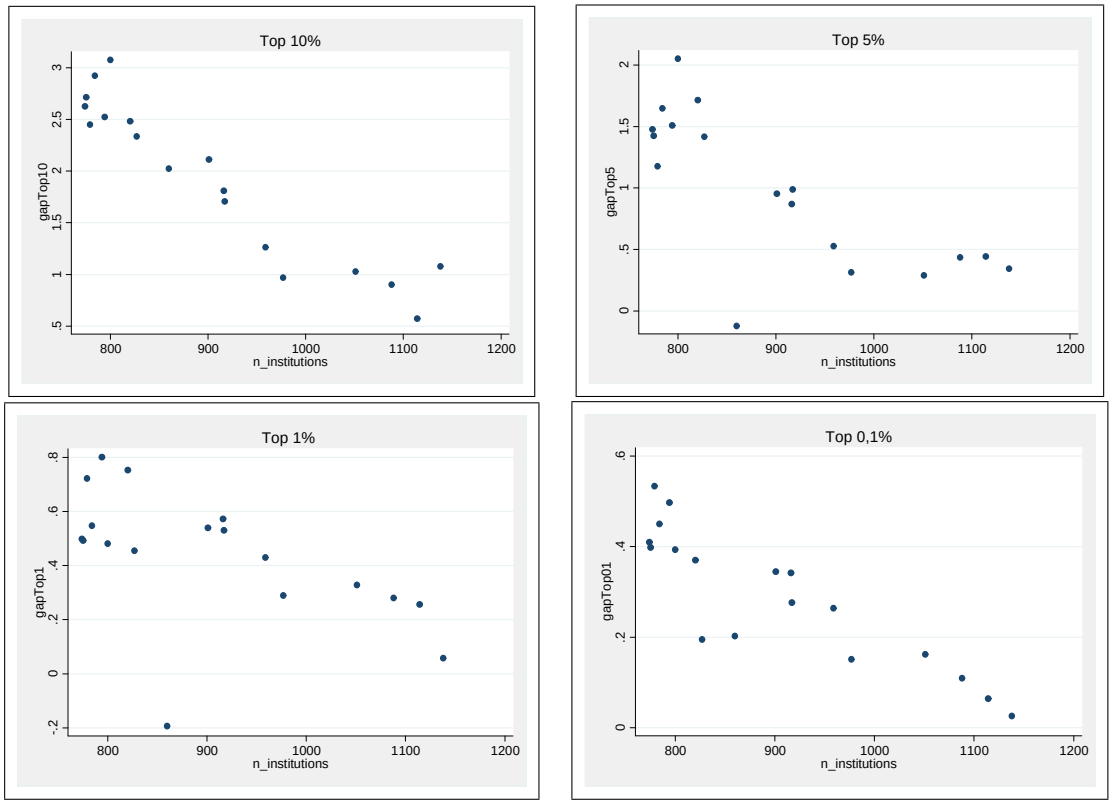

Figure 5.9: Scatter plot of the treatment effect 'gap Top' shares and number of bank institutions

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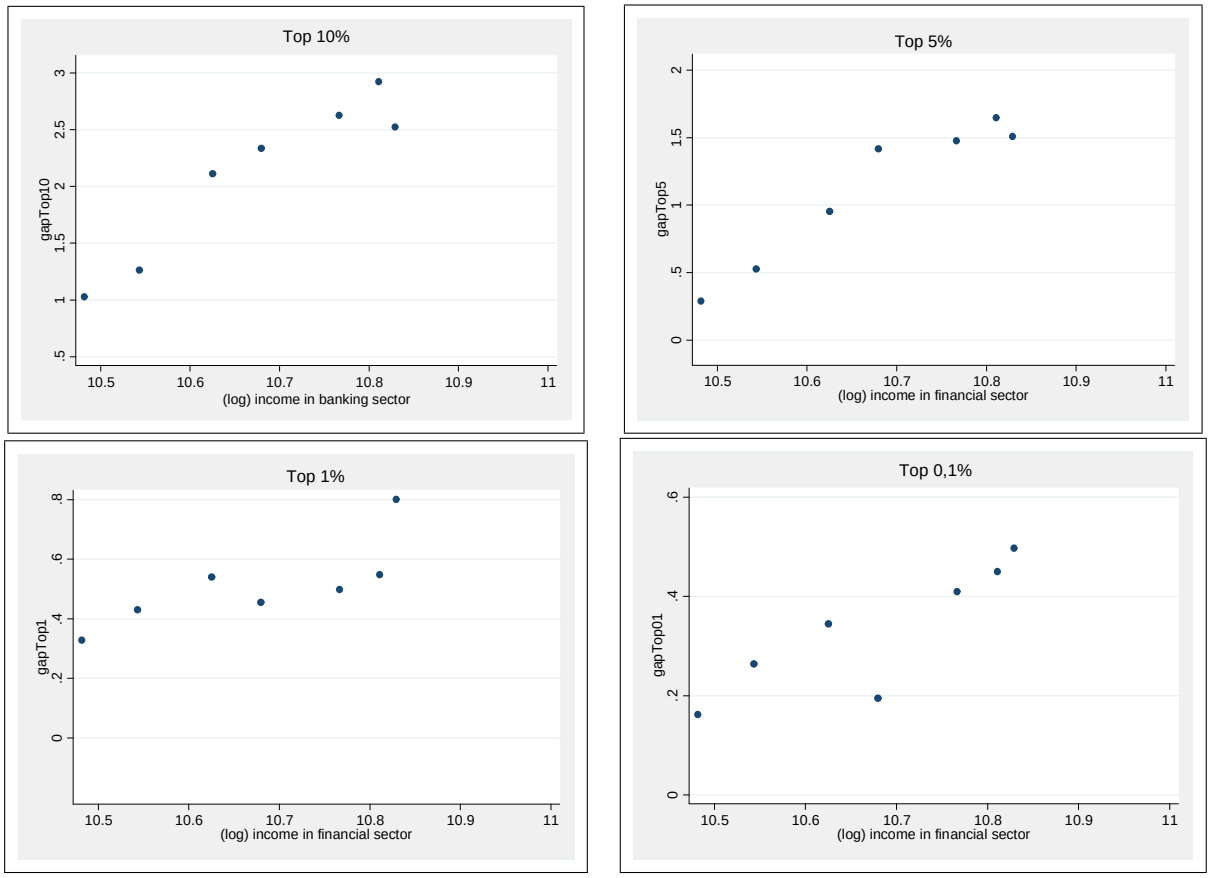

Figure 5.10: Scatter plot of the tretament effect 'gapTop' shares and the annual income of those ones employed in financial and banking sector.

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The scatter plots show some interesting patterns in the data, which might be further studied in future research.[30] With respect to each of these potential mechanisms, a clear relationship appears to exist overall. This somehow confirms that the effect of the banking deregulation (captured by the difference between the treated and the control group) is correlated with the different proxies identified as mechanisms. The only negative linear relationship shown in the data is with respect to the number of banking institutions. Indeed, the size of the deregulation effect widens as the number of banks decreases,which is in line with the wave of banking consolidation that has spread around the time of the deregulation implemented in the 90's, and consequently with the rise of few larger banks.

[30] The ones not reported did not display any significant patterns in the data.

5.3.2 Discussion of theoretical mechanisms.

The empirical correlations highlighted and depicted in this section somehow unveil important links. However, they need to be theoretically supported and explained to better understand how each channel may work. The banking deregulation in Italy involved two main processes: the rise of 'quasi universal' bank model and the privatisation. Some mechanisms investigated in this section can be imputed to a larger extent to the former, such as the structural change within the banking industry related to both non interest income from nontraditional activities and interest margins deriving from the traditional ones. Not much has been written about it and its link with income inequality.has been investigated even less.

'Similarly, investment banking and other nontraditional banking products that generate large amounts of fee income tend to be practiced at banking companies that are large enough to service big corporate clients. The composition of non-interest income also differs across banking companies of different sizes. Large banking companies generate disproportionately more non-interest income from securitizing and servicing mortgage and credit card loans, because the automated production processes used to produce these services exhibit substantial scale economies. Similarly, large banking companies are better able to employ the concentrations of financial experts and develop the institutional information databases necessary for the production of investment banking, insurance underwriting, and private banking (fiduciary) services.'

(De Young and Rice, 2004, pg 42)

This suggests that the non traditional banking service margins might to some extent explain the policy effect through: a) increased wages within the banking sector due to the higher complexity of the activities and of the processes the deregulation and consolidation led to (as depicted in Fig. 5.10); b) a wider range of risky and speculative activities (as direct consequence of financial deregulation and innovation) to be allocated among customers; c) big corporate clients that might have been the main beneficiary of these shift in banking activities and in bank size. This is confirmed in Fig. 5.7, which highlights a clear positive correlation between the policy effect and the non interest banking margin.

Privatisation has been one of the deregulation policies implemented during the 90's. It can be advocated by the parties as a political economy tool to gain the favour of voters (Biais & Perotti, 2002). Politicians might take recourse to that to develop forms of 'popular capitalism', supported by voters mainly involved in maximizing the value of their

financial assets. This channel might affect inequality through the under/overpricing of shares (Bortolotti et al., 2001). As macroeconomic theory prescribes, while the 'planned solution' involves an active participation of the government in maximizing the social welfare objective function, in a privatized economy the focus is not posed on distributional issues, but is mainly profit oriented. For the privatisation to be not only profitable but also efficient, it has to be accompanied by a perfectly competitive environment. Though, there is some evidence that between 1991 and 1995 that borrowing activity in Italy was cheaper by 44 basis points in state-owned banks than in private ones (Sapienza, 2003). This poses another interesting question, whether the privatisation was efficiently undertaken and if there are any margins of improvement. Possible outcomes of privatisation include higher profits (and dividends), more cost efficiency and higher productivity. The profits and the asymmetric managerial compensation schemes associated to them might lead to the higher top income inequality (if not entirely counterbalanced by a higher level of competition within the banking sector).[31]

Fig. 5.8 highlights a positive correlation between the policy effect and the stock price index. In fact, as a consequence of the wider diversification of activities supplied by the new deregulated banking sector - including brokerage, insurance agency and mutual funds sales - financial wealth of the top income earners might have increased, given their higher propensity to buy shares (Bortolotti et al., 2001) and also because capital gain workers tend to benefit more than labour income workers from deregulation policies (Chisari et al.,1997a). Moreover, the privatisation process and the change in bank ownership might have affected the market value of the banks involved in this as part of deregulation (Megginson, 1994). This last point is particularly relevant in case some banks were listed in the stock market.

An additional theoretical channel which might have contributed to boost the policy effect is the consolidation process within the banking sector (see Fig. 5.9). Banking concentration might have crucial redistributive implications since it directly affects the market and the number of agents within. As a consequence, the rise of large banks post-deregulation has changed both the market-share and the expected profits, but also the competitive environment among different sized banks. The mechanism of banking concentration is also closely linked to the optimal risk allocation: the lower the number of banks, the higher the level of risk allocation.[32]

[31] Hence, the results shown in this section might be justified in speculative terms and perhaps this can be a valid starting point for future research to build up a theoretical model keen at explaining this trend within the general equilibrium framework (see Galal et al. 1994, Chisari et al, 1997a).

[32] Large banks might have low incentives for precautionary behaviour, which leads to a worsening of workers' welfare. This may happen because the extra equity would benefit mainly the rest of the economy

Fig. 5.10, despite the few observations, appears to be capturing the direct effect of the deregulation on the wages earned by the ones employed within the banking sector. This correlation seems to be in line with the theoretical model predictions of Korinek and Kreamer (2014), according to which financial deregulation, banking concentration and financial innovation all together encourage more risk-taking (beneficial for the financial sector's development) at the expenses of the real economy and its efficiency. The authors assume the existence of imperfect and incomplete markets and they split the population in a very suitable way for the purpose of our analysis: the first group is represented by 'bankers' and the second one by the 'workers'. The incompleteness of financial markets, joined by the presence of binding financial constraints creates a distributive conflict between these two groups, which eventually tends to benefit mostly bankers' welfare, due to higher risk-taking opportunities, agency problems and market power (directly linked to banking consolidation).

This analysis of the plausible theoretical mechanisms discussed in this section might be helpful to deeply understand how deregulation has operated: not only the people working within the banking sector, but also the ones indirectly linked to banking activities have been affected by the deregulation wave and different forces might have worked at the same time, reinforcing the banking policy effect.

6 Robustness check

With respect to the robustness check implemented to assess the validity of the results with the SCM, we follow Abadie et al. (2003, 2010, 2015) and we run some placebo (or 'falsification') effects. The results are reported in the Appendix. One of them is called 'time placebo effect' and it consists of anticipating the time of the event, as if it had taken place earlier in time. The synthetic control group, to be reliable, should still fit the treated country in that case, confirming that only the real policy (event) implemented in 1987 and 1990 respectively in Canada and Italy, has had a real impact on the outcome variable.

The second placebo test suggested by Abadie et al. (2003), called 'in-space' placebo, is treating each of the donor countries, as if the event (financial deregulation in 1987 and 1990-1993) had occurred there and not in Canada, nor in Italy. This should exclude that results are obtained by chance. In other words, we iteratively apply the synthetic control group to each of the donor countries, by reassigning the control intervention to

(in presence of constraints) and the bankers' rents would decrease (Korinek and Kreamer, 2014).

one of the OECD countries (originally part of the synthetic control group).[33] For our results to be more reliable, we should expect a higher effect in Canada and Italy (the original treated units) compared to the treated donor units. Given the limited number of donors in the original pool, it is not possible to exclude the ones which perform worse. Placebo tests are reported not only graphically, but also numerically, by computing and standardizing the p-values, given the small sample size of the donors.[34]

Similarly to Abadie et al. (2015) we also include the ratio $\frac{post-MSPE}{pre-MSPE}$ (where the MSPE, mean square prediction error, represents a goodness of the fit) for each of the countries, the donors and the treated unit. An optimal robustness check should depict a higher ratio for the treated unit, suggesting a remarkable effect recorded after the event. However, this kind of placebo effects, as pointed out by Ferman and Pinto (2016), is somehow questionable and subject to criticism. Indeed, if it is true that the control group might fit well the treated unit in the pre-event period, the same might not hold for each of the donor countries when they are treated in the placebo test (the pool of donors for a given country, may not be as good for another artificial treatment unit).

Finally, as an additional robustness/sensitivity check, different combinations of control variables have been selected to create alternative control groups to run on the synthetic control methodology. The additional control variables include, among others, different indicators for stock market and bank development (see the Appendix for a comprehensive list of them).

7 Conclusion

The unstoppable rise of top income inequality worldwide over the past decades has become one of the most important challenges of our time. Finance, in its broader meaning, has been identified as one of the most influent and important determinants of the top income shares' increase. Indeed, there is empirical evidence worldwide that a considerable amount of top income earners belong to this industry and work as financial professionals. Since financial sector plays a crucial role in shaping inequality and the income distribution, it is reasonable to investigate to what extent financial reforms, which can alter both the financial industry and financial institutions, may affect the

[33] We are aware that each of the donor countries have implemented other financial reforms, but they did it much earlier or later in time. Hence this should not affect the reliability of the results. Furthermore, the reforms implemented in Canada and Italy appear to have introduced major changes and, consequently, their effects are expected to be of higher magnitude.

[34] To compute the standardized p-values, the command synth_runner (developed by Brian Quistorff) on stata has been implemented.

income distribution.

This paper aims at investigating how financial deregulation and, more precisely banking structural reforms (aiming at establishing quasi-'universal banks'), might affect the top income shares over time. Financial deregulation, indeed, shapes through many channels the financial industry and, consequently, a direct effect has expected to be found also in the top income shares. The analysis applies to two advanced economies: the case of Italy (reporting a widening gap between top and bottom tails of income distribution) and Canada (where the two richest Canadians own as much as the 30 deciles of the whole population). The financial reforms analysed in this work are respectively the financial reform packages implemented in Italy between 1990 and 1993 with the aim to privatize the banking sector and the '*Financial Institution and deposit insurance amendment act*', that passed in Canada in 1987. The most important innovation of the former financial reform ("Legge Amato" and "Testo Unico Bancario") has been the gradual privatisation of the banking system and the reintroduction of quasi 'universal banks'. This banking act, aiming at deregulating the financial service sector, encouraged a higher integration among commercial and investment banks. With respect to Canada, the '*Financial Institution and deposit insurance amendment act*' in 1987, established a gradual shift toward a more unified full service/universal bank model, dismissing the previous 'Four Pillars' system within the financial sector.

The evaluation of these policy packages is made by taking recourse to a novel approach, the synthetic control methodology. It allows creating a synthetic Italy and Canada, resulting from a weighted average of a pool of control countries, similar in their covariates to the treated country in the period pre-reform. In this way, it is possible to evaluate the effect that deregulation would have had on all the top income shares, if the reform had not occurred, by comparing the actual data of the treated country with the synthetic control. Similarly to Tanndal and Waldenström (2016), who find an impact of the 'Big Bank' reforms in UK and Japan on the top income earners, this analysis identifies the banking deregulation as a '*top inequality booster*'.

As an additional and novel contribution, the potential main channels via which the financial deregulation might have exerted its effects have been isolated and graphically analysed for the case of Italy only (given the wider availability of the data). They have been identified in the higher degree of banking consolidation and concentration over time (but at the same time also into a higher level of competition with the spreading of bank branches), in the higher level of income and wealth within the financial sector (firm size effect), in the higher risky profitability of banking activities and in the privatisation process that took place during that time. However, the contribution is very preliminary

and the limitation of data do not permit a deeper analysis of the mechanisms and further research is needed to shed light on these potential channels.

The findings of this work point out the rise of the top income shares in Italy and Canada, suggesting that policy makers should take into account this aspect when they implement policies aiming at reshaping the banking and, more in general, the financial industry. Indeed, it is still unclear whether these types of interventions are beneficial and/or harmful in terms of welfare (given the high degree of heterogeneity among agents, not fully exploitable at macroeconomic level). Given the lack of data of bottom income shares, we document that this policy positively affected the richest, but we cannot exclude it didn't exert any effects on the poorest too. The banking deregulation could have either been beneficial on all (but there is lack of data to confirm it), or only the richest might have benefitted from it. Indeed, while a good regulatory policy leaves all income groups better off, it only benefits the richest when it is inefficient. Future studies, as soon as data will become available, are strongly encouraged to further investigate this important aspect.

What can be said so far is that every change within the financial and banking sector might have remarkable direct implications in terms of redistribution. Policy makers need to acknowledge this aspect in order to design interventions that can pursue and boost at the same time the efficiency in finance and a lower degree of income inequality.

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Table 8.1: Comparison of predictors - Canada SCM

Predictors	treated		synthetic			mean
		Top10P	Top5P	Top1P	Top01P	
growth	2.79	2.27	1.95	2.06	2.24	2.653
GDPPCcons	25381.57	15622.33	28195.09	21647.53	27521.95	24926.765
rightwing	0.43	0.05	0.00	0.27	0.46	0.391
govgdp	22.19	15.37	12.77	17.49	22.04	19.474
TopIncomeTaxRate	0.35	0.45	0.44	0.52	0.62	0.614
civil_law	0.00	0.95	1.00	0.83	0.96	0.732
french_law	0.00	0.95	0.55	0.39	0.12	0.243
capital_quinn	80.36	61.50	78.28	77.19	81.63	67.904

Table 8.2: Comparison of predictors- Italy SCM

Predictors	treated			syntehtic		mean
		Top10P	Top5P	Top1P	Top01P	
growth	2.503	2.500	2.759	2.500	2.255	2.561
GDPPCcons	27125.775	23169.158	23925.757	28224.809	30207.852	29749.050
right_wing	0.259	0.000	0.332	0.237	0.269	0.342
enroll_tert	29.050	26.354	29.423	28.155	28.677	28.467
gov	20.422	18.365	19.042	18.749	21.457	19.769
Top Income Tax Rate	0.621	0.636	0.577	0.585	0.646	0.618
civ_com	0.723	1.000	0.381	0.714	0.977	0.802
frsp_mom	0.435	1.000	0.335	0.457	0.465	0.287
BCred_Dep	111.457	86.940	106.262	115.995	113.152	103.295
capital_quinn	74.946	80.682	71.503	77.143	78.493	75.711
empl_SERV%	62.790	54.909	63.507	61.952	62.394	61.937

8 Appendix

Tables of SCG (Syntehtic control groups)

The tables report the means for each of the treated countries, Canada and Italy. For a good syntehtic control group, the means of the synthetic control groups should be closer to the mean of the treated country rather than to the mean of the donors' pool.

Composition of donors' pool.

The donors' pool for each of the treated units is reported. In the original pool of donors the Scandinavian countries (which experienced a financial crisis at the beginning of the 1990) are included. However, we decided not to remove them as they do not really affect the results, since they have null weight in the synthetic control group composition.

Table 8.3: Composition of the donors' pool - Canada

Donors	Top10P	Top5P	Top1P	Top01P
Australia	0	0	0	0.040
Denmark	0	0	0	0.483
France	0	0	0	0
Ireland	0.055	0	0.171	/
Japan	0	0	0	0
Netherlands	0	0	0	/
NewZealand	0	0	0	/
Norway	0	0	0	0
Spain	0.945	0.553	0.389	0.124
Sweden	0	0	0	0
Switzerland	0	0.447	0.091	0
Finland	/	/	0.065	/
Germany	/	/	0.284	0.353

Table 8.4: Composition of donors' pool - Italy

Donors	Top10P	Top5P	Top1P	Top01P
Australia	0.180	0.451	0.193	0.022
Denmark	0	0	0	0.184
France	0.484	0.335	0.457	0.465
Ireland	0	/	0	/
Netherlands	0	0	0	/
NewZealand	0	0.168	0.092	/
Norway	0	0	0	0
Spain	/	/	/	/
Sweden	0.336	0.007	0.068	0.194
Switzerland	/	0.039	0.189	0.134
Finland	/	0	0	/
Germany	/	/	/	/

Placebo test

In this section the placebo test are reported with respect to Canada and Italy. As depicted by the graphs, the placebo test appears to perform better with respect to Canada (mainly for the Top 1% and Top 0,1%). As the pool of countries used to create a synthetic control group is already very limited, also those units not well fitting the pre-trend period are included in the placebo. However, mainly with respect to the case of Italy, it is evident how some of them should not include in the analysis (like the Scandinavian countries which experienced a crises in the 90s). Their weight in creating the synthetic control group is, in any case, null. (equal to 0).

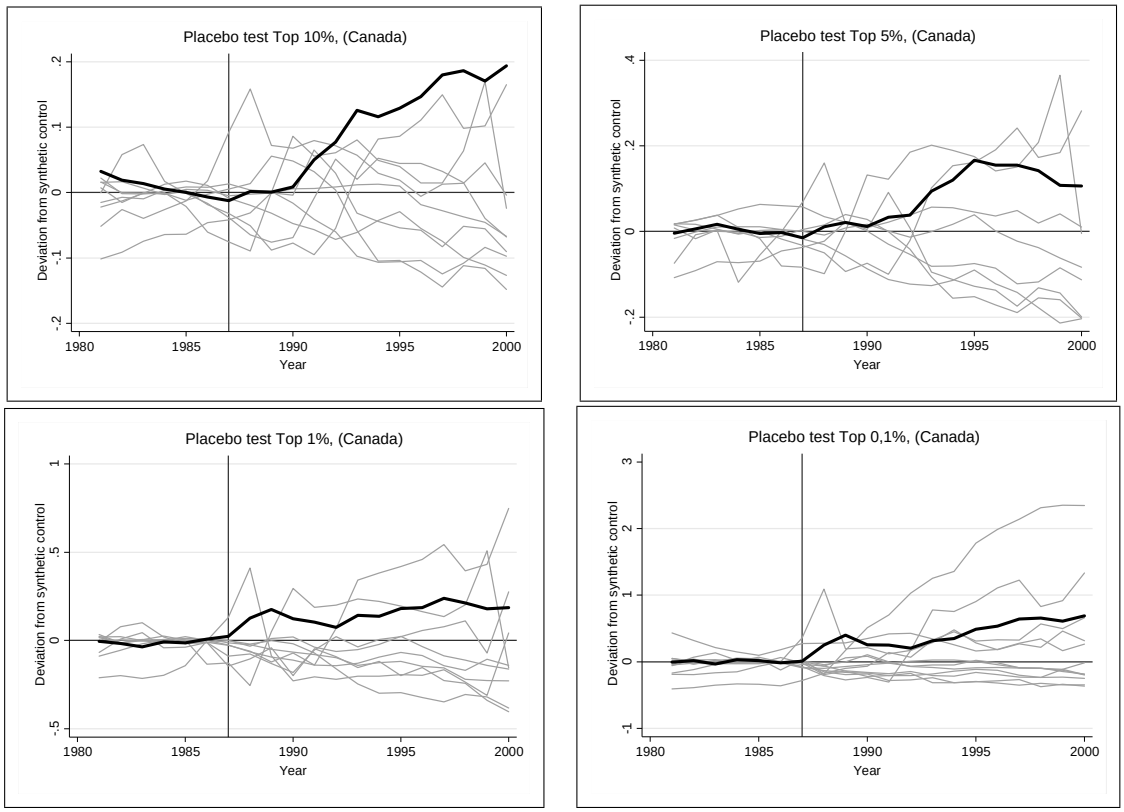

Figure 8.1: Placebo test Canada: The black solid line represent the percentage deviation of Canada from its baseline synthetic control group. The grey lines represent the deviation gap for every country in the donor pool when they are considered tretaed units (deviations should be as close as possible to 0 if the original syntehtic control group is well constructed)

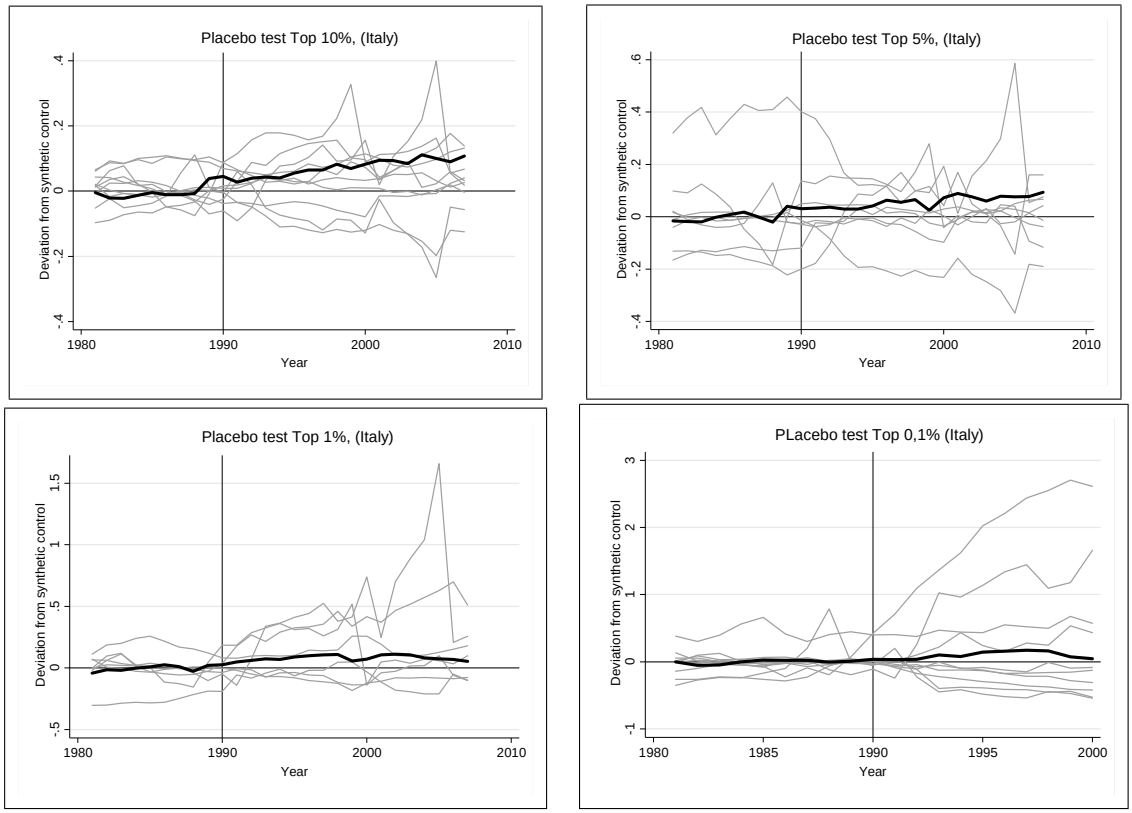

Figure 8.2: Placebo test Italy: The black solid line represent the percentage deviation of Italy from its baseline synthetic control group. The grey lines represent the deviation gap for every country in the donor pool when they are considered tretaed units (deviations should be as close as possible to 0 if the original syntehtic control group is well constructed)

By following Abadie (2015), also the ratios of the post/pre MSPE are reported for each of the outcome variables in both countries. However, this test does not ensure the goodness of all the donor countries, as it assumes that in the pre-intervention period, each of them does fit well the trend of the treated unit. In truth, to perform this test also the 'bad'donor countries have been included, to increase the sample size. Not surprisingly, when the post-pre ratio for Italy is computed, there are the Scandinavian countries, which report a higher value,probably due to the shock they experienced at the beginning of the 1990s.

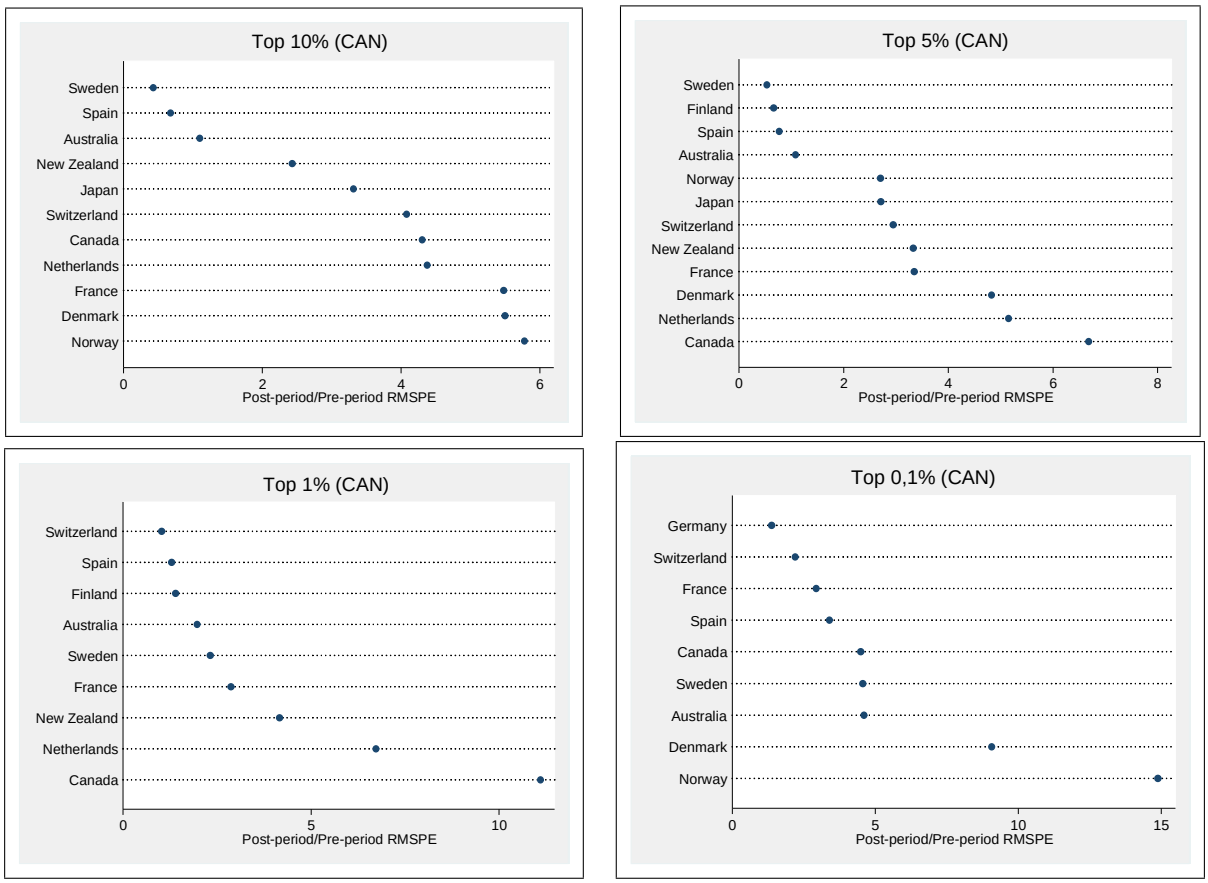

Figure 8.3: Post/Pre- MSPE Canada: a higher value is expected to be reported for the treated unit, if the synthetic control group is well fitting.

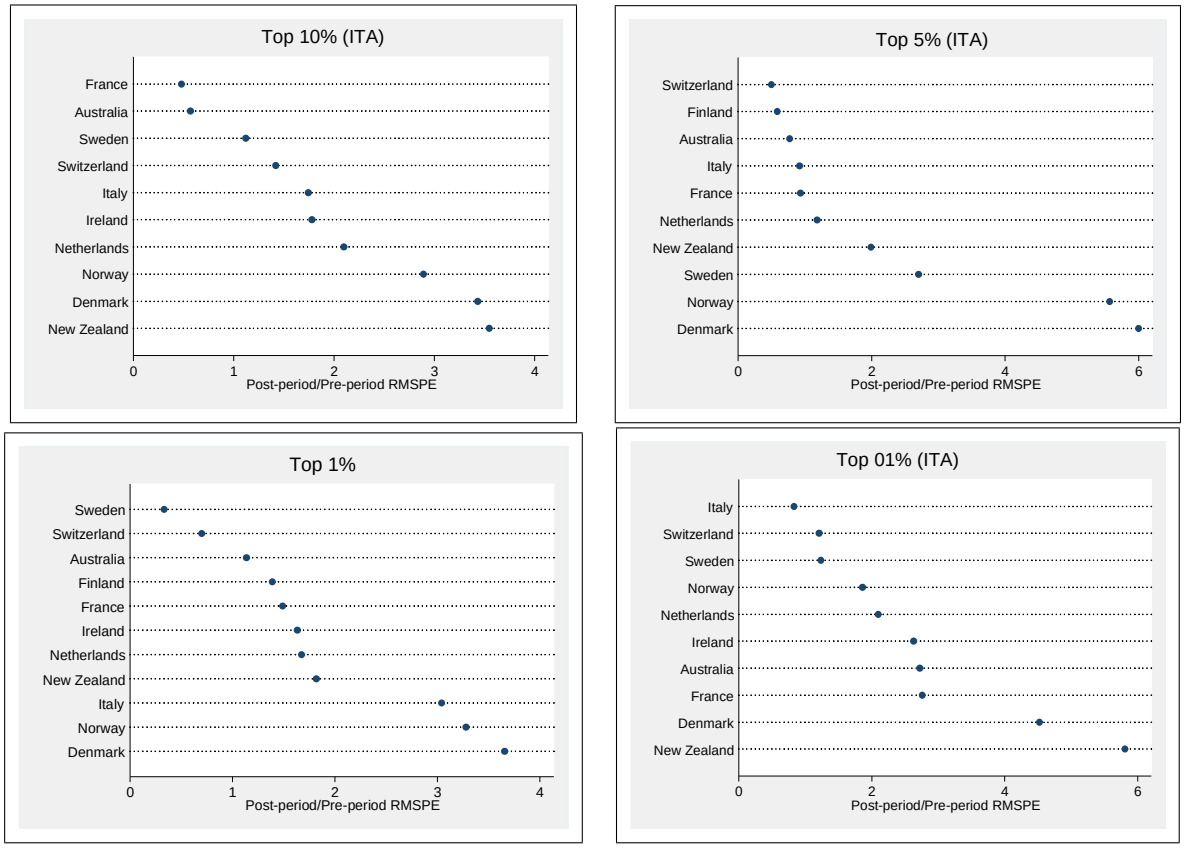

Figure 8.4: Post/Pre- MSPE Italy: a higher value is expected to be reported for the treated unit, if the synthetic control group is well fitting.

Sensitivity test of control variables.

To test the sensitivity of the results, different combinations of variables are used as predictors to create alternative synthetic control groups. As it is depicted in the graphs, the several control groups implemented with a different set of predictors perform, overall, well and fits the pre-event period. However, in case of the Top10% and Top 5% in Italy, there are some synthetic control groups which fit poorly,depending on the different combinations of variables.

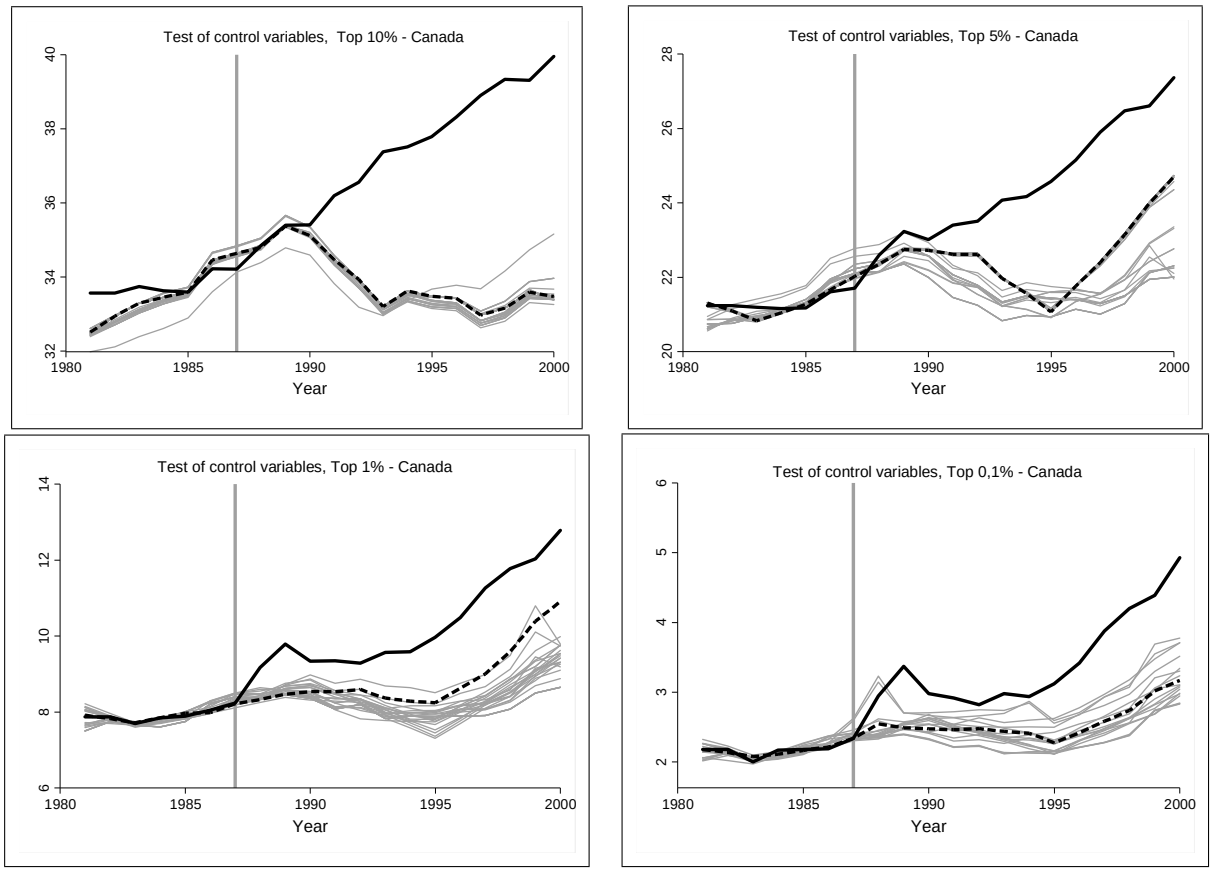

Figure 8.5: Canada: The black solid line represents the treated unit and the dashed line the original synthetic control group created with the baseline predictors. The grey lines represent the alternative synthetic control groups whether different combinations of predicators were implemented.

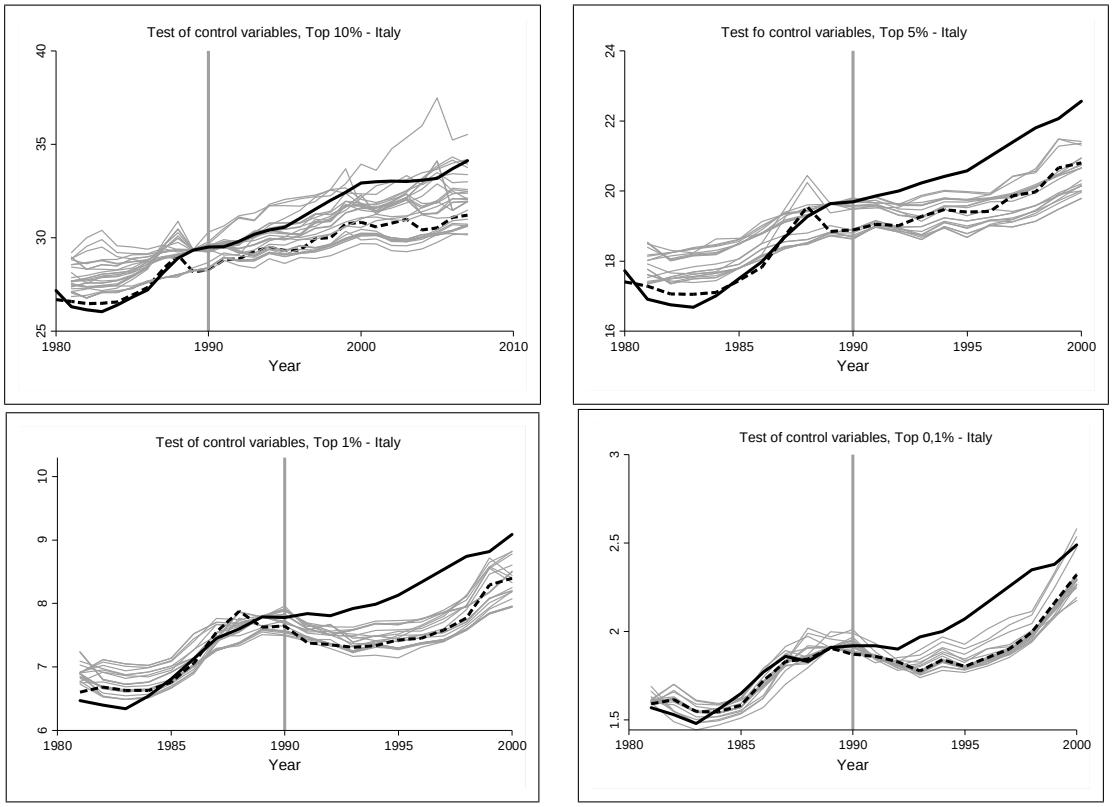

Figure 8.6: Italy: The black solid line represents the treated unit and the dashed line the original synthetic control group created with the baseline predictors. The grey lines represent the alternative synthetic control groups whether different combinations of predicators were implemented.

Heterogeneity in sources of income.

In the following graph the different sources of income are decomposed, by taking recourse to the data provided by Alvaredo and Pisano (2010). These data come from a different data source and they are mainly based on the tax and micro data, provided by Italian government. Hence, they might somehow differ from the shares in the WIID database. However, it is likely that the same general conclusions hold. The main insight is to provide a graphic representation of the considerable degree of heterogeneity in terms of income composition within the right tale of the distribution.

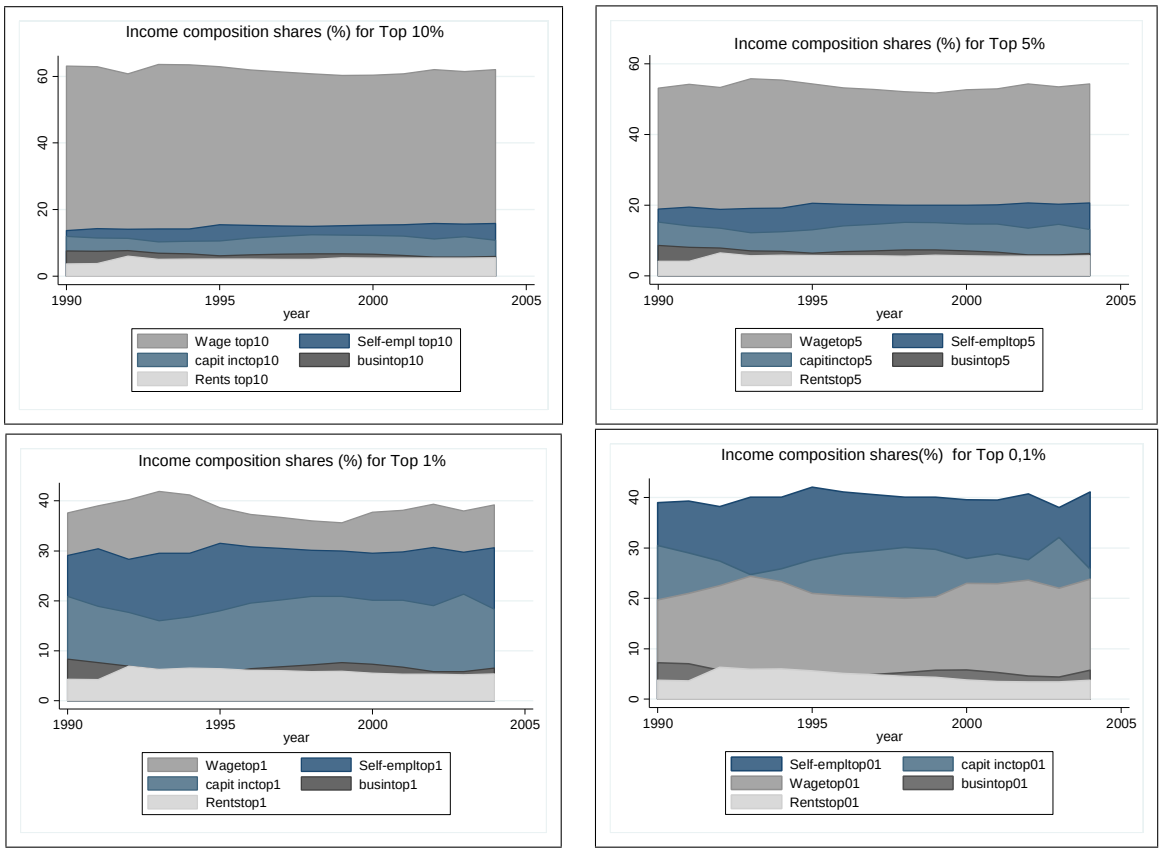

Figure 8.7: Decomposition of income sources, among the top income shares in Italy. Source: Alvaredo and Pisano (2010).

As shown in the figure, the main component of income is represented by the 'wages', when the Top10% and Top5% are taken into account. On the contrary, self-employment and capital income represent the largest source for the Top1% and Top 0,1% of the distribution. This might help explaining as well the different effects of financial deregulation on the outcome variables and why different channels might operate differently in the right tale of the income distribution.

Alternative control variables.

By following Tanndal and Waldenström (2016), additional control variables are used to create alternative combinations of synthetic control groups.

Additional Control	Description	Source
TaxINdICP	Tax revenues from income, profits and capital gains	OECD
Top tax rate	marginal income tax rate	Piketty et al 2014
growth	Annual GDP growth	WDI
GDPPCurr	GDP p.c. , current prices	WDI
exports	Exports %GDP	WDI
imports	Import %GDP	WDI
GDPPCons	GDP p.c. , constant prices 2005 USD	WDI
ka_index	Index of financil openness	Chinn and Ito, 2012
rightwing	Right-wing party	World Bank, Keefer, 2012
pr_voting	Proportional voting system	World Bank, Keefer, 2013
Stock_mkt	stock market liberalization index	Kaminsky and Schmunkler, 2008
DFS_liberal	Domestic Financial Sector index	Kaminsky and Schmunkler, 2009
unemp	unemployment rate	OECD
current_quinn	Quinn index (current account)	Quinn, 1997
capital_quinn	Quinn index (capital account)	Quinn, 1998
epl	Employment protection indicator	Nickell, 2006
un_cov	Union coverage	Nickell, 2007
cellphone	N. cellphones p.c	Comin and Hobijin, 2009
Stock_mkt_cap	Stock market capitalization (%GDP)	Beck et al, 2010 a
ger_legal	German legal origin	La Porta et al, 1997
uk_legal	UK legal origin	La Porta et al, 1998
rule_law	Rule of Law	La Porta et al, 1999

Table 8.5: Additional control variables

Banking deregulation and households'consumption behaviour. The case of Italy in the early 1990's.

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February 2019

Abstract

This paper aims at evaluating if and to what extent banking deregulation in the early 1990's in Italy has affected Italian households' consumption smoothing. The *'Survey of households' income and wealth'* (SHIW), provided by the Bank of Italy is used to exploit the high degree of heterogeneity among individuals. First, it will be tested whether banking reforms aiming at privatising the banking sector and reintroducing the quasi *'universal banks'* has changed the consumption's response to income shocks and whether differences among heterogenous subsamples emerge. Second, it will be studied whether financial deregulation has made the market more complete and frictionless and how this may translate in terms of inequality (both at consumption and income level). In addition, the ability to insure against shocks might be closely linked to the changes experienced by the market institutions. This, in fact, might play a crucial role in explaining the gap between consumption and income inequality over time. Hence, the last question this paper has the purpose to answer is to measure whether banking deregulation might account for this gap and a detailed analysis of the transmission channels will be undertaken.

JEL codes: D12, D91, I30

*We thank Yu Zheng, R. Santaeulàlia-Llopis, J Ludwig, who provided me with the benchmark codes for my analysis.

1 Introduction

In this paper the main aim is to test the role exerted by financial macro policies on welfare through their effects on consumption smoothing. Indeed, risk preferences and the stagnation of real wages over the decades, combined with a greater degree of income volatility, may induce a decrese in the households' well-being (Brandolini, 2005). [1] More in details, this works aims at testing whether the financial deregulation, occurred in Italy in the early 1990's, has affected the sensitivity of consumption to transitory and permanent income shocks among Italian households (by taking into account the high degree of heterogeneity among them). Indeed, theory prescribes that transitory shocks should not exert any impact on welfare, given their perfect insurability.[2] However, empirical literature has often found an overreaction in consumption of households to transitory income shocks, while an underreaction when permanent income shocks take place (Ochmann and Beznoska, 2012; Campbell and Mankiw, 1990; Bernanke, 1985). Consumption smoothing may be very costly in presence of income shocks and it can consequently harm welfare as well. Financial deregulation might exert a direct effect on these costs, by making cheaper for the households to insure themselves against these shocks (by lowering liquidity constraints and making easier the borrowing and lending activities in the credit market).[3]This, if true, might be of extreme relevance in terms of macroeconomic policy and financial stability, given also the relevance of households' consumption as a major component of the GDP (Pistaferri, 2015). Besides, to be able to infer from households' consumption behaviour may be extremely informative on the degree of insurability and, hence, this can have crucial implications for welfare policies.

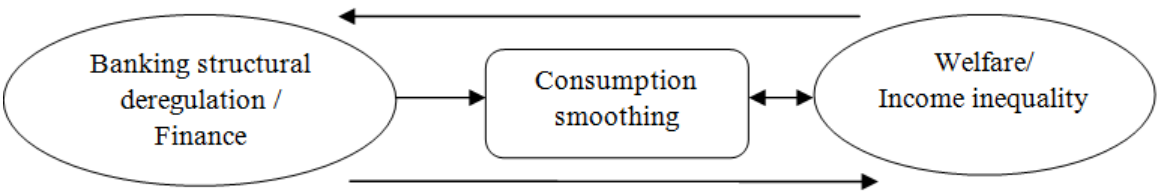

Figure 1: Effects of financial deregulation on welfare thorugh consumption smoothing.

[1]There are many other channels through which finance may affect welfare and also income inequality: via college enrollment (Levine and Rubinstein 2013); via the returns to jobs within the financial sector (Philippon and Reshef 2012; Kaplan and Rauh 2010); through the elasticity of income with respect to financial output (Philippon and Reshef 2013, Bell and Van Reenen 2010).

[2]'[..] consumption is believed to be a better measure of welfare than income' (Pistaferri, 2015).

[3]Larger consolidated banks, as a consequence of the structural banking deregulation, might ease the income insurance through geographical diversification and also by a wider range of financial products to offer (Demyanyk et al., 2007).

As a natural experiment for the purpose of this work, I exploit the banking reforms implemented in Italy between 1990 and 1993, namely the "Amato's Banking Privatisation Law" and the TUB ("Testo Unico Bancario"- Consolidated banking law).[4]They played a crucial role in shaping the banking structure and the credit markets. The most important innovation of the former financial reform has been the fast privatisation of the banking system and the reintroduction of the quasi *'universal banks'*. This banking act, aiming at deregulating the financial service sector, encouraged a higher integration among commercial and investment banks and it allowed more entry in the banking sector, more likely of better managed banks. It is still unclear, though, how this reform might affect liquidity constraints and consequently consumption smoothing: on the one hand, an increase in competition and efficiency appeared to have occurred which translated into lower interest rates and a cheaper borrowing activities (Bertola et al. 2006) ; on the other hand, the consolidation that followed deregulation (Coletti and Corona, 2004, Messori, 2001) might be associated to the *'bank lending bias'*, that is when banks prefer to lend to those clients who are already rich and wealthy. In the first case there would be an improvement along the *'extensive margin'*, while in the second one the benefits from the deregulation would be limited to the *'intensive margin'*.

As pointed out by Demyanyk et al.(2007), intrastate banking deregulation favour banking consolidation, which eventually makes more likely for these big banks to operate at a more international level, by favouring a higher integration across borders. Credit markets play a crucial role for the households' saving and consumption choices and even more in Italy, a bank-based economy where banks are the most important financial actors and dominate the financial system (Paiella, 2003). Hence, it is likely that such reforms may affect the households' balance sheets and their consumption smoothing, other than the level of inequality (at consumption and income level).[5] We ask whether insurance may alter in response to a change in the economic and institutional environment. In fact, it is still unclear the effects of financial reforms on welfare and, more in general on insurance ability: the initial conditions to ensure the implementation of a valid reforming process are still somehow unknown and 'is not obvious by what mechanisms financial reform contributes to a subsequent diffusion of welfare and what initial conditions are favorable to "good" financial reform and which one are not' (Claessens and Perotti, 2007, p.28).

This work analyses whether banking deregulation and privatisation process within the banking sector may be responsible for the increasing gap between consumption and income inequality and whether the insurance degree has been changing over time (before-post deregu-

[4] *'structure of the financial system can be considered exogenous with respect to the choice of individual consumers'* Jappelli and Pistaferri (2011, EJ).

[5] Credit constraints can reduce the ability of households of smoothing consumption, increasing income dependency.

lation) in a setting of the *'partial insurance model'*. In addition the high degree of heterogeneity in the data will be exploited by quantitatively estimating the insurance parameters by subgroups, depending on housing tenure, employment status, and by geography (North versus South) (Crockett, 1964).[6]

Hence, I will study both the cross section and the time dimension variation with respect to the impact of banking deregulation. Given the high degree of heterogeneity among households (also shown in the descriptive statistics in Section 4), we expect to find not only a different and significant estimates of the insurance parameters among different groups, but also a significant change in their value over time, which will be an indirect proof of how institutional changes may matter in shaping households' behaviour in terms of insurance and consumption smoothing. According to theory, income shocks should be perfectly insurable if individuals could borrow and lend freely, in absence of liquidity credit constraints. Hence, it is crucial to understand whether or not banking deregulation positively affected the insurance ability of households via a wider access to the basic banking services and an improve of efficiency. This can give researchers and policymakers valuable information regarding individuals' choices of intertemporal consumption smoothing.

This paper provides a first attempt to link the banking deregulation (or more in general a change in the banking institutional environment) with the consumption insurance ability of agents. What this work points out is a general worsening of the partial insurance against temporary income shocks in the period post-deregulation, while an improvement in the consumption insurance against permanent income shocks. In addition, banking deregulation appears to be a co-factor at explaining the increasing inequality gap over time, defined as the difference between income and consumption inequality. It appears to be negatively associated to consumption inequality (which tends to decrease, the higher is the degree of banking deregulation) and positively associated to income inequality. To the best of our knowledge, this work is the first one that exploits the banking deregulation of the 1990's in Italy as an exogenous event for this purpose and with the latest version of the *'Survey of households' income and wealth'* (hereafter SHIW), which provides with new insights in terms of heterogenous consumption responses to income shocks among the multiple subsamples.

The rest of the paper is organized as follows. Section 2 presents the literature background. Section 3 discusses the data construction. Section 4 shows some descriptive statistics and facts, sheding light on income and consumption inequality. Section 5 explains the methodology implemented to address the research questions of this work. Section 6 gives a preview of the

[6]The polarization North-South is a well known issue of Italian economic history. The original idea was to create additional subsamples according to brith cohorts, income quintiles, sector of employments and education. However, the too limited amount of observations at the beginning of the sample did not allow to exploit the heterogenity along these dimensions.

preliminary results and Section 7 discusses the main results. Conclusions follow.

2 Literature review

This works aims at empirically reconciling the representative agent based literature on financial deregulation with the one focusing on the households' heterogeneity, namely the HANK, 'Heterogenous Agent New Keynesian' models (Kaplan et al., 2016; Gornemann et al., 2016; Oh and Reis, 2012). Indeed, the households in the survey are different in their characteristics and behaviours. Hence, it is reasonsable to investigate whether the same exongenous event, such as the banking deregulation, might exert different effects in terms of insurability on these heterogenous subsamples.

An interesting study carried out by Guiso, Sapienza and Zingales (2007) has stressed the positive impact of the banking deregulation in Italy in the early 1990's (the same exploited in our study), by using as a natural experiment the abolishment of the tight fascist banking regulation that was initiated in 1936. Their main results point out, as a direct consequence of the higher banking competition, an increase in the NPL (Non Performing Loans), a wider access to credit market, a higher number of firms (more entrpreneurship), a higher GDP growth rate. Besides, they claim how deregulation made all local markets equally competitive, eradicating the initial differencies among them and allowing less competitive local markets to converge and catch up.

Sheding light on the effects of financial deregulation on heterogenous households' balance sheets and consumption behavior in presence of income shocks may better explain the role exerted by banking institutions on households' life and their ability to insure themselves. As claimed by Korinek and Kreamer (2014), financial deregulation (as much as financial innovation and banks bailout) can directly affect not only the financial sector but also the real economy, in terms of welfare and distributional effects. They claim there exists a trade off between the efficiency in financial sector (achievable with higher deregulation and risk taking) versus efficiency in the real sector (tighter regulation and more stable supply of credit). They justify it by taking recourse to market imperfections and market incompleteness, namely the lack of risk sharing and the presence of financial constraints in the banking sector. In their model they predict how financial deregulation (and more in general any other change within the financial sector) might have direct effects on income distribution and on consumers' welfare. In their model they divide the population in two groups, the 'bankers' (to refer more generally to professionals working within the financial sector) and the 'workers'. What they conclude is that bankers may earn rents when risk-taking creates an aggregate scarcity of bank capital ('bottlenecks' effect). Their model shapes the channels through which welfare and income is

redistributed from workers to bankers (by increasing the volatility of bank equity). Hence, they predict how the same shock basically affects differently these two income groups.

At the same time, international consumption smoothing has implications also in the process of macroeconomic policies' design (Olekalns, 1997). Jappelli and Pistaferri (2009) in their study aiming at comparing both consumption and income inequality find, in line with the previous literature, a faster growth in income inequality since the early '90s, mainly due to a much higher degree of instability in earnings and income (and not attributable to a change in the wage structure). They also conjecture, without empirically testing it, that Italian households might have been very good at smoothing income shocks in the 1990's, given the financial deregulation background of that period and a wider access to credit market for some of them.[7] Indeed, they suggest that the financial reforms led to a decrease in the interest rate, which increased the propensity to borrow and a consequent relaxation of the borrowing constraints, eventually widening the access to credit markets. The authors point out how the transitory component of inequality is much more informative at explaining the inequality trend in Italy.

Blundell et al. (2008) find some evidence of the presence of heterogenous effects in the study of the consumption inequality and partial insurance in the US (by relying on micro data), with respect to the degree of education, birth cohort and level of wealth.[8]. More precisely, they point out a lower degree of insurance with respect to permanent shocks among non college educated households. In addition, older cohorts are better at smoothing permanent income shocks than the younger ones. According to their results, the higher income instability has been due to a higher volatility in the permanent income shocks before 1985; while after that year, the volatility of transitory income shock has grown much faster. The gap between consumption and income inequality has taken place not because insuring consumption has become relatively easier all of the sudden, but because the increase in inequality over the last years has been mainly accounted for by a temporary component. Overall, they find some support of almost complete insurance of transitory shocks, with the exception for the low-wealth households.

In their pioneer work, Jappelli and Pistaferri (2011) evaluate whether the financial integration and liberalization, brought by the introduction of the Euro, has changed the sensitivity of consumption among Italian households to permanent and transitory income shocks. What they expect is a decrease in the excess sensitivity parameter (as response to a transitory shock). The authors find, although not statistically significant, that the sensitivity of consumption to

[7]However, there is some empirical evidence that banking deregulation might affect negatively the welfare of households: larger and consolidated banks might be much more reluctant to lend to small firms or households with low level of wealth, due to asymmetric information. On the contrary, small banks rely more extensively on soft information, namely personal relatioships with the clients (Houston, James and Marcus, 1997) and those firms tend to lend less by banks involeved in mergers (Bonaccorsi, Di Patti and Gobbi, 2007)

[8]'Partial insurance' refers to the degree of transmission of income shocks to consumption

income shocks tend to decline after the introduction of the euro. They point out an increase of income inequality, depicted in the data, which is mainly accounted for by an increase in the transitory component of the income shock, especially among the less educated households. The main reason of this, according to their interpretation, is the liberalization in the Italian labour market and the rise in part-time and more flexible contracts. They consider the financial structure as exogenous with respect to the choice of individual consumers and, hence, a perfect event to study consumers' behaviour. The authors justify their hypothesis, by stating that financial integration might have improved the risk sharing opportunities and the consumption smoothing, given the higher degree of diversification in risks and equity portfolios; the improvement in the efficiency of financial intermediation and a wider access to credit for households. The same reasons might be appropriate with respect to the Italian banking structural reforms studied in this paper. However, not only pros but also cons are expected to follow the privatisation and liberalization process within banking sector, in terms of households' welfare. Hence, the expected sign and the size of the change in the consumption sensitivity to permanent and transitory shocks after banking structural reforms are somehow unclear.

Christian (2015) studies whether financial integration has increased the welfare of European households (by relying on two comprehensive datasets, the ECHP and the EU-SILC). His results suggest a heterogenous effect of the financial integration between different income level groups and in different points in time: from 1994 to 2000 the change in financial integration has benefited mostly the ones previously not exposed to the financial system (extensive margin); from 2004 til 2008,these benefits have been spread out along the intensive margin.

An interesting piece of work is the one of Ludwig (2015), where he uses the PSID biannual data (from 1998 to 2012) to test whether the households above and below the median react differently in terms of consumption to permanent and income shocks. He finds that the poor households are better at reducing income risk and they do not seem to differentiate between transitory and permanent income shocks. The households above the median, instead, face smaller shocks and they differentiate between permanent and transitory shocks, by behaving accordingly to the permanent income hypothesis. This justifies why it is important to exploit the heterogeneity among households, since the individual characteristics may play a crucial role in depecting different behaviours in presence of shocks.

The full account of heterogeneity in the data has been exploited by Casado (2011) in his work aiming at quantifying the degree of consumption insurance of spanish households, with respect to transitory and permanent income shocks over the period 1985-1997. Indeed, the author measures the degree of partial insurance across several subgorups: time cohorts, employment stuatus, education levels, city size, wealth and house tenure. Interestingly, he finds evidence of partial insurance for permanent income shocks and almost complete insurance for

transitory shocks. More in details, a higher degree of insurance for permanent income shocks is found among higher educated, home-owner, wealthier households. On the contrary, a lower insurance capacity appears to be depicted among the less educated, tenants, younger cohorts and poorer households.

An interesting piece of work, which studies how the consumption insurance may vary over time, as a result of the economic development process and structural institutional changes, is the one of Santaeulàlia-Llopis and Zheng (2018). They exploit a unique micro survey data to decompose the income process and estimate the consumption insurance parameters between the rural and the urban subsamples in China, over two time intervals, before and after 1997, corresponding to a period of unprecedent economic growth. They point out a worsening of the consumption insurance with respect to the permanent and transitory income shocks, over the market transition process. The only exception regards the urban subsample, whose consumption insurance against transitory income shocks improved after 1997.

There is an extensive literature about consumption smoothing, but surprisingly a very limited strand linking it to financial deregulation and changes within the banking sector. One of the few has been found in Siobhan (1995), who analyses whether the financial deregulation in Ireland, during the 80s, has exerted a significant impact on households' consumption behaviour. She finds some evidence of a decline in the excessive sensitivity parameter of consumption to changes in the current income. However, this effect is not statistically significant. She justifies her results by claiming that financial deregulation might have led to a substitution effect of price rationing with quantities and that its effects on consumption has not occurred yet.

Similarly, Olekalns (1997) documents in his paper the existence of some significant and remarkable changes as a consequence of financial deregulation which took place in Australia. In the pre-deregulation period, expected decrease in income affected the level of consumption, which implied a failure of the Permanent Income Hypothesis (PIH). On the contrary, in the period post-deregulation he finds that Australian households behave in accordance with the PIH, by smoothing their consumption as the theory prescribes, presumably because of the relaxation of the liquidity constraints, as a consequence of financial deregulation. Sarno and Taylor (1998) analyse how financial deregulation in UK affected the consumption expenditure. They adopt a non-linear instrumental variable approach, by concluding that deregulation (calculated as *'the total stock of consumer credit outstanding as a proportion of personal disposable income', pg.230)* considerably and significantly reduced the share of liquidity constrained agents, making them more able to smooth consumption over their lifetime. Same results has been documented already in Bayoumi (1993), who uses an instrumental variables three stage least squares (3SLS) in order to evaluate the link between financial deregulation and consumption smoothing in UK.

He finds out the suboptimal level of consumption over the period 1974-1979, while an optimal level of consumption seems to be depicted in the aftermath of financial deregulation (1984-1987). His contribution has been pioneristic in aknowledging the importance of deregulation in financial sector in shaping consumption behaviour.

These are studies that mainly rely on macro data. My work would differ, as it would exploit extensively the considerable amount of micro data which are available in the *'Survey of households' income and wealth'* (SHIW). Hence, it would be possible to make meaningful inferences about the distributional consequences of a specific banking policy and provide policy maker with new insights.

2.1 Research questions and contribution of the paper

The full account of these previous results and research would entail answering the main research questions of this work:

1. **Did financial deregulation in Italy in the early 1990's improve risk-sharing and consumption smoothing among households?**

   (a) *Did financial deregulation affect the sensitivity of consumption to income shock?* If it did, are the parameters different among heterogenous groups of households? Zeldes (1989), Carrol and Kimball (1996) and Pistaferri (2015) find some evidence of a lower marginal propensity to consume out of wealth for richer households, to indicate that the behaviours of different income groups might diverge. Moreover, according to Christian (2015), financial integration may allow countries to specialize in specific industries, exposing themselves to higher vulnerability to industry-specific-shocks. This might be also true at a micro-level, where some households employed in specific sectors might be less or more vulnerable to particular shocks (through the labour channel). [9] (Blundell et al, 2008, AER)

   (b) *Did financial deregulation make the market more complete and what are the implications for income inequality?* Indeed, the parameters of the income shocks are also informative about the degree of credit and insurance market completeness (Attanasio and Pavoni, 2006; Blundell et al. 2008). [10] We can also consider the markets as more complete whenever the extensive margin and financial inclusion get wider, by providing households with access to basic financial/banking services, which

[9] 'This suggests that the degree of insurance should be allowed to differ between transitory and permanent shocks and should also be allowed to change over time and across different groups.'

[10] The parameter for the permanent and transitory component of the income shocks can measure the severity of the informational frictions.

may translate into a lower level of inequality (Honohan, 2004b). If the markets became more complete and efficient, slightly less imperfect and more frictionless post deregulation and privatisation, theory prescribes a decrease in the level of inequality (Atkinson, Bourguignon, 2014; Greenwood and Jovanovic, 1990). Indeed, if the deregulation has made the banking sector more efficient, we should expect from it a higher ability to reduce the monitoring/screening costs and select a higher quality borrowers, assuming a transparent and rich institutional environment and lack of political instability (Claessens and Perotti, 2007).

2. **Can financial deregulation account for the gap between income and consumption inequality?** Indeed, a proper analysis of consumption inequality is closely linked to financial institutions and their changes over time. This may matter in explaining its dynamics and the reason why it has been flatter compared to income inequality (Attanasio, 1999; Jappelli and Pistaferri, 2011).

3 Data

The dataset exploited in this work is the *'Survey of households' income and wealth'* (hereafter SHIW), provided by the Bank of Italy. It surveys a considerable and representative amount of the Italian resident population (approximately 8000 households). The choice to study households' behaviour is due to multiple reasons. First, the higher degree of heterogeneity which can be exploited in the data: households may differ in their individual preferences, in their socio-demographic characteristics and in their level of income/wealth. Hence, it is important to address this heterogeneity, with the aim to correctly evaluate the different effects that the same policies may have with respect to different agents (Christian, 2015). Second, the banking deregulation, being the object of this study, copied with the availability of credit supply (both at the intensive and extensive margin), structural change and competition within the banking sector. As pointed out by Guiso, Sapienza and Zingales (2007) and also by Bayoumi (1993), it's more likely that consumer spending (households) will be more responsive than business investments (firms). In addition, also Demyanyk et al. (2007) suggest how changes in the pattern of the credit supply might be of extreme relevance in the way financial deregulation might affect the income and consumption smoothing. Given the long series of the data, the analysis will be carried until 2016, which will make also easier the identification strategy. Until 1987 the data are annual, while afterwards the survey has been conducted every other year with the exception of the 3 years apart gap over 1995-1998. Since 1987 some households have been re-interviewed from the previous surveys, by then starting the panel dimension of the data.

Moreover, this share has been increasing over time: from 15% in 1989, till 50% in 1995 (Jappelli and Pistaferri, 2008). Micro data are essential to exploit at the most the remarkable degree of heterogeneity among households (in terms of income, wealth, education, and other demographic variables) and answer to macroeconomic questions.[11] *'Microeconomic data provide direct evidence on the household-level underpinnings of wealth effects and allow to investigate the relative weight of the direct and indirect channels'* in the linkage from changes in wealth accumulation to changes in saving and spending' (Paiella, 2003). Moreover, it is easier to limit the aggregation bias which may overestimate the role played by the wealthiest families and their weight, and reporting their appropriate and true influence. The interval of interest for the purpose of this study spans from 1980 until 2016. It provides extremely detailed information on income,consumption, financial wealth, other than the demographic variables regarding the families in the sample, by making it *'the main source of income distribution in Italy'* (Boeri and Brandolini, 2005). The surveys collects data concerning:

- Consumption and savings (durable vs non-durable consumption; housing expenses, health, insurance..);
- Income (wages and salaries, income from self-employment, pensions, other financial transfers);
- Socio-demographic variables (such as gender, education, employment sector, age,...);
- Wealth (financial assets, real assets, liabilities).[12]

First, all the observations having negative or values equal to 0 of consumption and income have been discarded. Moreover, also those households that experienced changes over time in the household's head (due to events involving changes in their marital status). Second, only individuals in the age interval 25-60 have been kept in the analysis, as a standard practice in the income dynamics literature. Third, those households whose income grew by more than 500% or decrease by far the 80% or having 100 Euro as annual income have been dropped out the sample, as 'outliers' (Blundell et al., 2008). Last, only the household's heads being interviewed at least four consecutive waves (from 1987) has been kept in the analysis, in order to be able to estimate the parameters of interest (Santaeulàlia-LLopis and Zheng, 2017).

In the baseline model we define consumption as the total non-durable consumption; the disposable income as the benchmark income, as sum of agriculture income, labor market income, business income and public and private transfers, netting out the capital income (as in

[11] As all the households dataset, also the SHIW does not reflect adequately the presence of the richest and wealthiest families in the survey, which tend to under-report their assets or not to respond to the questionnaire. Hence, their presence is under-represented.

[12] Data on wealth composition are availbale only from 1987.

Jappelli and Pistaferri, 2011). By following Blundell et al. (2008), both female and male household's heads are taken into account in the baseline analysis, but in the robustness section the analysis will be restricted to the male subsample only. The full account of the financial deregulation and its implications in terms of consumption behaviour and income inequality among households, would allow to design more appropriate macroeconomic policies being focused not merely on boosting the financial sector size and its profitability per sè, but improving the welfare for all households and ensuring efficiency in the real economy as well. To acknowledge the real effects (in terms of income and consumption) that financial deregulation might exert could make policymakers more keen to design optimal policies aiming at setting up better insurance tools and hence, providing a higher degree of stability in the real economy.

4 Descriptive statistics

In the following section some preliminary descriptive statistics and some graphs will be displayed, in order to better visualize the potential changes that might have occurred at the time of the deregulation. Fig. 2 shows the dynamics of the consumption and income inequality over time. Until the early 1990's the gap between them has been limited and the trend appears to be similar. Afterwards, the level of income inequality (measured as the variance of the logarithm of both variables) has increased remarkably, while the consumption inequality, after a temporary but limited increase, has gradually flattened out. Similarly, the trend of the vari-

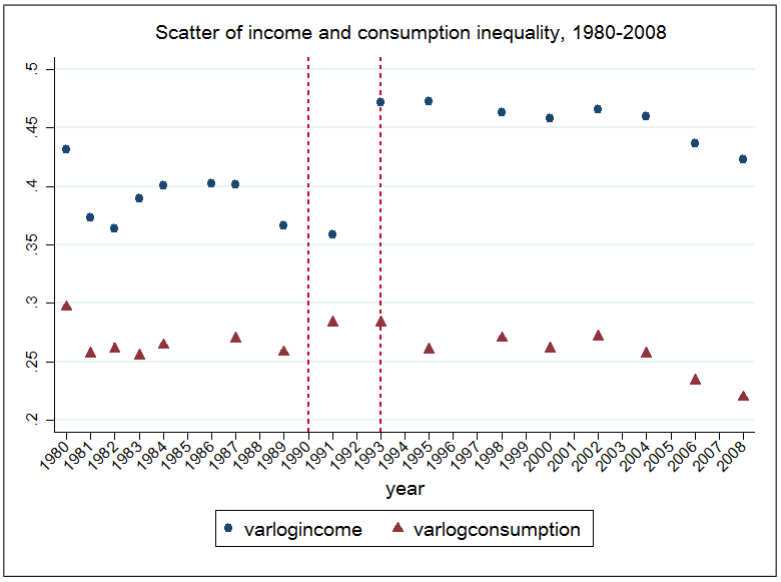

Figure 2: Scatter of income and consumption variance over time.

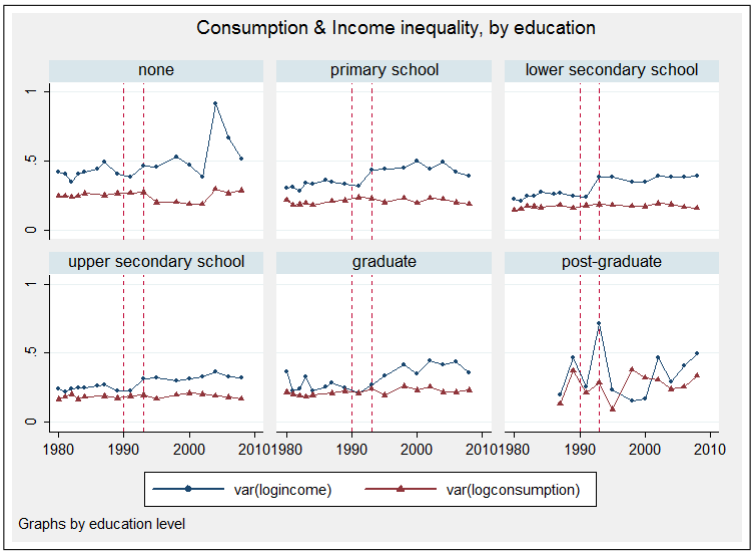

Figure 3: Scatter of income and consumption variance over time, by education level.

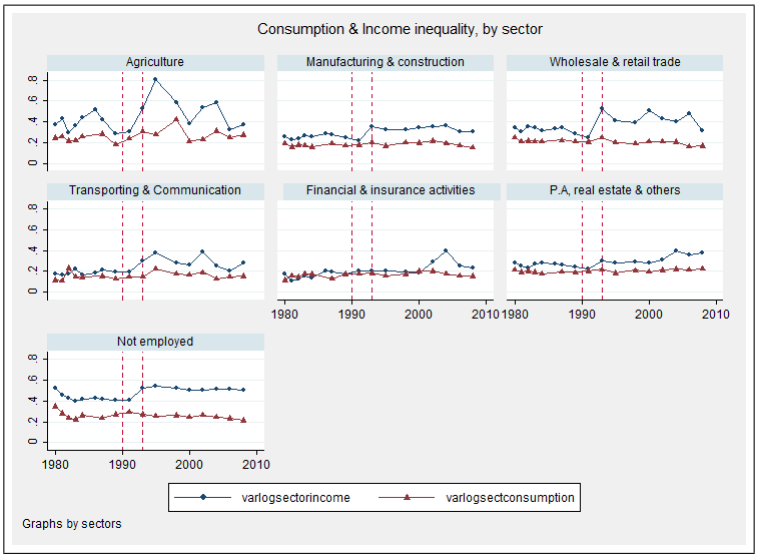

Figure 4: Scatter of income and consumption variance over time, by employment sector.

ance of consumption and income has been estimated with respect to the education level and the employment sector and some interesting and remarkable differencies appear to take place (Fig.3 and Fig.4). This may reflects the high level of heterogeneity among Italian households. Fig.5 shows the trend of income and consumption inequality based on housing tenure (and the composition of illiquid financial assets). At a first glance, before the time of the banking deregulation, the level of income inequality was higher among the house owners and lower among the tenants. Since the early 1990's there has been a trend inversion, with the variance of the logarithm of income being much higher for the tenants rather than for the owners. Possible reasons may lie within their higher income risk and the presence of liquidity constraints, more likely to occur among those ones unable to post a collateral in order to borrow. In line with the

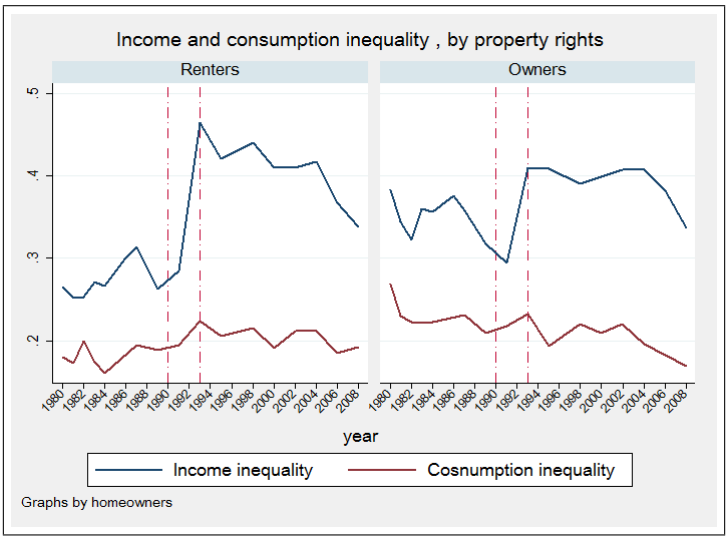

Figure 5: Consumption and income inequality over time between house owners and tenants.

empirical findings of Krueger at al. (2010) and Ludwig (2015), the difference between income and consumption inequality is much bigger in the bottom quintile of the income distribution, compared to the top income quintile. This seems to suggest that poor households are relatively more able to smooth consumption and reduce the uncertainty (in this case welfare policies may be responsible for that).

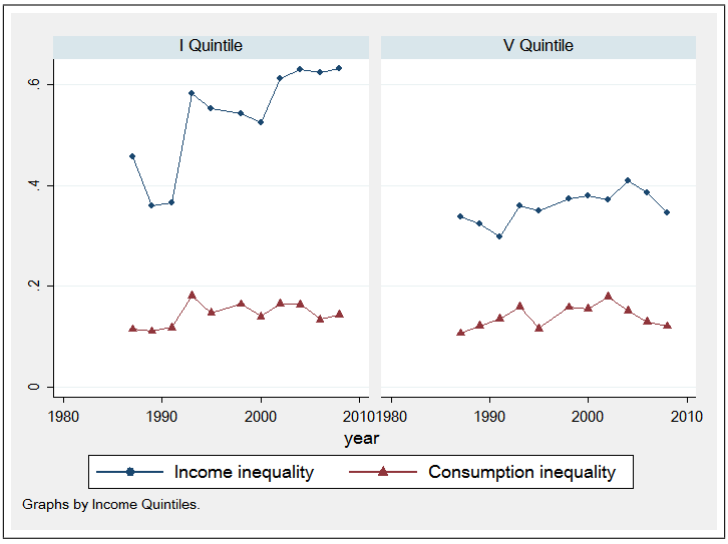

Figure 6: Income and consumption inequality in the bottom and top income quintile.

5 Methodology

5.1 Theoretical background

In order to address the research questions that this work aims at answering, different steps need to be followed. First, the income process must be estimated with the aim to disentangle the transitory and the permanent component of the income shock.[13].The generalization of the procedure shown in Blundell et al. (2008) is shown as follows[14]:

$$logY_{it} = Z_{it}\varphi_t + P_{it} + v_{it} \tag{1}$$

where i and t are subscripts for individual and time, respectively;$logY$ is the logarithm of the disposable income (comprehensive of labor income and transfer income); Z represent a set of covariates such as age, age^2, education level; family size, employment dummies, sector of employment, geographic region of residence. All of them might co-explain the level of income of the households. And [15]

$$v_{it} = \sum_{j=0}^{q} \theta * \epsilon_{it-j} \tag{2}$$

[13]For a thorough understanding of the estimation process and steps, see Blundell et al. (2008); Meghir and Pistaferri (2004)

[14]The biannual nature of the SHIW imposes slight modifications when the model in difference is estimated (Santaeulàlia-Llopis and Zeng, 2017; Ludwig, 2015). See the Appendix of this work.

[15]The order 'q' needs to be determined empirically.

and

$$P_{it} = P_{it-1} * \rho + \zeta_{it} \tag{3}$$

with the general form of an autoregressive process of order'p', denoted by AR(p). In case the autocorrelation parameter ρ is equal to 1, then the equation 3 reduces to a 'random walk'.

$$P_{it} = Y_P \approx \quad \text{Martingale process = Permanent component}$$
$$v_{it} = Y_T \approx \quad \text{MA(q)= Transitory component}$$

$$\hat{y}_{it} = logY_{it} - Z_{it}\varphi_t = P_{it} + v_{it}$$

$$\hat{y}_{it} - \hat{y}_{it-1} = (P_{it} - P_{it-1}) + (v_{it} - v_{it-1})$$

$$\Delta y_{it} = \zeta_{it} + \Delta v_{it} \tag{4}$$

By following Jappelli and Pistaferri (2011), the income process is assumed to be evolving exogenously and it represents the only form of idionsycratic risk that households need to insure against. This first stage is crucial to disentangle the income shocks components in order to shed light on the mechanism's transmission of income shocks to consumption (c_{it} is the log of real consumption). The permanent shock is ζ_{it} and ϕ_{it} is the factor loading measuring the consumption's response to this type of shock; the transitory component is ϵ_{it} and its factor loading is represented by ψ_{it}. The random term ξ_{it} captures the independent component of consumption, such as the innovation term but also its measurement error. The parameters of interest for this analysis are ϕ_{it} and ψ_{it}, also called *'partial insurance'* parameters.

$$\Delta c_{it} = \phi_{it}\zeta_{it} + \psi_{it}\epsilon_{it} + \xi_{it} \tag{5}$$

Equation 5, which is an approximation of the Euler equation (see Blundell et al, 2008 for a thorough explanation) assuming constant relative risk aversion preferences, shows how consumption growth dependes on taste shifts ζ (age, family size, gender..) and income shocks. The analysis of these parameters over time and across groups of households is crucial to test the hypothesis of this work. Since banking deregulation might have improved the insurance opportunities for the households, the parameters of interest are expected to decrease after the deregulation. As claimed by Jappelli and Pistaferri (2011), this reduction is most likely (but not necessarily) to occur with respect to the transitory component ψ_{it}, while it is less unclair the potential effect it might exert on the consumption's response to permanent income shocks. According to the consumption theory, different cases might be depicted depending on the values assumed by these structural parameters.

I CASE: Full Insurance : ψ_{it}= ϕ_{it}=0
II CASE: No Insurance: ψ_{it}= ϕ_{it}=1
III CASE: Partial Insurance: $0 < \psi_{it} < 1$ and $0 < \phi_{it} < 1$

A particular case of the III Case is the *'Permanent Income Hypothesis (PIH)'*, where ψ_{it}=0 and ϕ_{it}=1, according to which households respond to permanent income shocks only, while they are perfectly able to smooth out and insured against transitory shocks. In the last case, the closer to zero are the parameters, the better the insurability against the shocks (both permanent and transitory).

The equations *(4)* and *(5)* are crucial to estimate the residuals which will be used in the later step in order to calculate the autocovariance-variance matrix of the income and consumption. Indeed, the parameters of interest which are necessary to estimate the model are ψ_{it}; ϕ_{it};σ^2_ξ;σ^2_ζ; σ^2_ϵ. They are calculated by taking recourse to several moments of income and consumption process as follows:

$$\begin{aligned}\sigma^2_\zeta = E[\Delta y_{it}(\Delta y_{it-1} + \Delta y_{it} + \Delta y_{it+1})] = \\ \sigma^2_y + E[\Delta y_{it}(\Delta y_{it-1}] + E[\Delta y_{it}(\Delta y_{it+1}]\end{aligned} \tag{6}$$

$$\begin{aligned}\sigma^2_\epsilon = E[\Delta y_{it}\, \Delta y_{it-1}] = E[\Delta y_{it}\, \Delta y_{it+1}] \\ - Cov(\Delta y_{it}, \Delta y_{it+1})\end{aligned} \tag{7}$$

$$\phi = \frac{E[\Delta c_{it}(\Delta y_{it-1} + \Delta y_{it} + \Delta y_{it})]}{\sigma^2_\zeta} \tag{8}$$

$$\psi = \frac{E[\Delta c_{it}(\Delta y_{it+1})]}{-\sigma^2_\epsilon} \tag{9}$$

$$\begin{aligned}\sigma^2_\xi = E[\Delta c_{it}(\Delta c_{it-1} + \Delta c_{it} + \Delta c_{it+1})] - \\ \frac{[E(\Delta c_{it}(\Delta y_{it-1} + \Delta y_{it} + \Delta y_{it+1})]^2}{\sigma^2_\zeta} + \\ \frac{[E(\Delta c_{it}\, \Delta y_{it+1})]^2}{-\sigma^2_\epsilon}\end{aligned} \tag{10}$$

5.2 The empirical strategy

The first step to take is to estimate the residuals that will be then used to calculate the autocovariance-variance matrix.

Step I: The variables of interest are regressed on a set of covariates.

$$logIncome_{it} = \alpha_0 + \alpha_1 \sum Z_{it} + \epsilon \tag{11}$$

$$logconsumption_{it} = \beta_0 + \beta_1 \sum Z_{it} + \eta \tag{12}$$

The covariates Z include: year dummies, age, age^2, education level, birth cohort; family size, employment dummies, sector of employment, geographic region of residence, number of children.

Step II: Residuals from the previous regressions are estimated and saved and the consumption and income growth of residuals are computed.

StepIII: For each year in the sample period 1987-2008 the autocovariance-variance matrix is computed with respect to income and consumption.[16] More precisely, the variance, the autocovariance of n. orders are computed empirically, and finally the contemporaneous and lagged covariance between income and consumption are measured. It is important to keep in mind that with biannual data additional identification problems might arise (Ludwig, 2015) and the estimation of the consumption growth regression must be adjusetd accordingly.[17]

Step IV: By calculating the moments of the income and consumption distribution, the parameters of interest can be computed and the model can be estimated.

6 Results

6.1 Partial insurance model

In this section, the results of the first step of the analysis are shown and commented. First, the residuals of both consumption and income have been estimated. Fig.7 depicts the transitory and the permanent components of the income shocks separately, which clarifies to what extent each of them account for in explaining the level of income inequality. By following Blundell et al (2008) and also Santaeulàlia-Llopis and Zheng (2018), I estimate the income process in two

[16]Only from 1987 the SHIW some households start being re-interviewed for both for consumption and income, which allows me to implement the Blundell et al. (2008) estimation approach. Indeed, as tthe authors claim, *'Using panel data on both consumption and income improves efficiency of these estimates because it provides extra moments for identification.* Indeed, relying on a panel dimension makes possible calculating the autocovariances of the variables of interest.

[17]See Ludwig, J. (2015) and Sanaelàlia-Llopis and Zheng (2017) for a detailed explanation. They assume that the insurance parameters will remain costant between t and t-1.

steps with the Diagonally Weighted Minimum Distance estimator (DWMD), which allows for heteroskedasticity (Ludwig, 2015). In the first step, only the income data are used to estimate the variance of the permanent and transitory component. In the second step, these parameters are calculated by using both income and consumption data. The results estimated by these two different sets of data are close to each other and confirm that the permanent component follows an AR(1), as in Borella (2001) plus a transitory component shaped as a i.i.d (available upon request). As claimed by Blundell et al. (2008, page 1905) *'There is a close accordance between the two series which provides a check on the validity of our specification.* Hence, we can consider the income process estimation well validated and measured.[18] An interesting

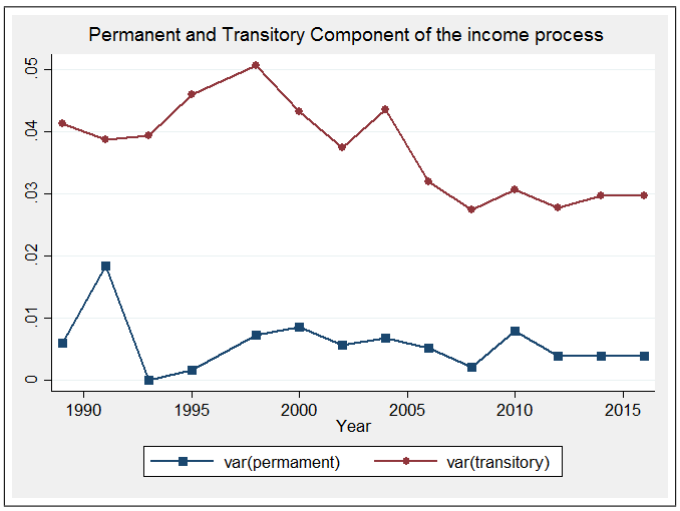

Figure 7: The covariance structure of the income, netting out the observable factors, has been estimated. The figure reports the dynamics of the permanent and transitory components of the estimated income process with a AR(1) for the permanent component and a i.i.d error for the case of a transitory shock. Only income data have been used.

trend depicted in Fig.7 is the gradual convergence of transitory and permanent component of income during the reference time sample (1987-2008). In the mid nineties indeed the gap between these two components was much wider, while over time there has been a gradual convergence. Interestingly, the transitory income component appears to be the predominant source of the total income inequality.

However, to completely identify the process, the last two parameters ϕ_{it} and ψ_{it} are required and both income and consumption data need to be employed at this stage.

[18]Standard errors have been computed with the bootstrap procedure.

Table 1: Minimum Distance Variance Estimator: Income process

Parameters	Full sample	Owners	Tenants	North	South	Unemployed
σ^2_ζ	(1)	(2)	(3)	(4)	(5)	(6)
1989	0.018***	0.020***	0.039***	0.020***	0.022***	0.014
	[0.00557]	[0.00572]	[0.00472]	[0.00304]	[0.00006]	[0.01834]
1991	0.032***	0.030***	0.078***	0.037***	0.031***	0.025***
	[0.00349]	[0.00463]	[0.00089]	[0.00051]	[0.00657]	[0.002353]
1993	0.013***	0.013***	0.016	0.009	0.016***	0.013***
	[0.00169]	[0.00285]	[0.00615]	[0.00705]	[0.00137]	[0.001028]
1995	0.017***	0.015***	0.060***	0.018***	0.018***	0.012***
	[0.00154]	[0.00173]	[0.00242]	[0.00341]	[0.00117]	[0.003067]
1998	0.022***	0.023***	0.036*	0.022***	0.030 ***	0.016***
	[0.00248]	[0.00322]	[0.01060]	[0.00002]	[0.00115]	[0.000247]
2000	0.023***	0.022***	0.063***	0.020***	0.028 ***	0.020***
	[0.00237]	[0.00208]	[0.00240]	[0.00426]	[0.00274]	[0.003204]
2002	0.018***	0.019***	0.054***	0.021***	0.020***	0.015***
	[0.00199]	[0.00099]	[0.00405]	[0.00267]	[0.00376]	[0.00021]
2004	0.02***	0.019***	0.058***	0.019***	0.020***	0.019***
	[0.00171]	[0.00266]	[0.00373]	[0.00068]	[0.00134]	[0.00256]
2006	0.016***	0.015***	0.039***	0.015***	0.018***	0.015***
	[0.00127]	[0.00098]	[0.00216]	[0.00136]	[0.00066]	[0.002555]
2008	0.014***	0.014***	0.021***	0.013***	0.013***	0.009***
	[0.00123]	[0.00174]	[0.0013]	[0.00444]	[0.00052]	[0.000564]
2010	0.021***	0.017	0.046***	0.023***	0.019***	0.017***
	[0.00176]	[0.00127]	[0.00437]	[0.0005]	[0.00179]	[0.00165]
2012	0.016***	0.015***	0.032***	0.014***	0.019***	0.013***
	[0.00164]	[0.00182]	[0.00245]	[0.00551]	[0.0015]	[0.00139]
N.obs	38,899	28,559	7,006	17,305	13743	21,175

This table shows the estimation results of the income process by using the DWMD estimator and both income and consumption data. The variance of the permanent income shocks for the full sample and for some subsamples are reported. Standard errors are estimated based on 50 bootstrap replicas. We assume that the permanent and the transitory shocks remain constant within the period between two consecutive waves of the survey. To limit the number of parameters to be estimated and for stablity concerns, the σ^2_ζ in 2012 is supposed to be equal to the one in 2014 and 2016.

Table 2: Minimum Distance Variance Estimator: Income Process

Parameters	Full sample	Owners	Tenants	North	South	Unemployed
σ_ϵ^2	(1)	(2)	(3)	(4)	(5)	(6)
1989	0.037***	0.032***	0.030***	0.036***	0.025***	0.047***
	[0.00876]	[0.01152]	[0.00616]	[0.01178]	[0.00767]	[0.0266]
1991	0.032***	0.033***	0.020**	0.025***	0.044***	0.038***
	[0.00535]	[0.00925]	[0.00949]	[0.00609]	[0.00976]	[0.00156]
1993	0.036***	0.036***	0.037*	0.036***	0.036***	0.034***
	[0.00412]	[0.00314]	[0.0214]	[0.00453]	[0.00288]	[0.00274]
1995	0.038***	0.038***	0.048***	0.030***	0.055***	0.030***
	[0.00279]	[0.00449]	[0.00524]	[0.00757]	[0.00137]	[0.003]
1998	0.045***	0.044***	0.064***	0.032***	0.064***	0.056***
	[0.00454]	[0.00585]	[0.00366]	[0.00518]	[0.00451]	[0.0061]
2000	0.038***	0.037***	0.030***	0.033***	0.041***	0.030***
	[0.00324]	[0.00342]	[0.00419]	[0.0002]	[0.01197]	[0.00904]
2002	0.032***	0.029***	0.025***	0.027***	0.038***	0.030***
	[0.00309]	[0.00487]	[0.00142]	[0.00922]	[0.00532]	[0.00119]
2004	0.039***	0.037***	0.026***	0.037***	0.048***	0.032***
	[0.00315]	[0.00443]	[0.00073]	[0.00572]	[0.00464]	[0.00085]
2006	0.027***	0.026***	0.028***	0.023***	0.035***	0.021***
	[0.00235]	[0.00224]	[0.00200]	[0.00046]	[0.00007]	[0.00129]
2008	0.023***	0.022***	0.013***	0.016***	0.031***	0.018***
	[0.00159]	[0.00186]	[0.00277]	[0.00152]	[0.00015]	[0.00256]
2010	0.023***	0.021***	0.034***	0.017***	0.029***	0.022***
	[0.00188]	[0.00169]	[0.00659]	[0.00159]	[0.00874]	[0.00149]
2012	0.022***	0.021***	0.029***	0.019***	0.025***	0.015***
	[0.00301]	[0.00206]	[0.008]	[0.00124]	[0.0007]	[0.00012]
2014	0.025***	0.022***	0.026***	0.022***	0.028***	0.020***
	[0.00251]	[0.0022]	[0.00314]	[0.00521]	[0.00161]	[0.00094]
N.obs	38,899	28,559	7,006	17,305	13743	21,175

This table shows the estimation results of the income process by using the DWMD estimator and both income and consumption data. The variance of the transitory income shocks for the full sample and for some subsamples are reported. Standard errors are estimated based on 50 bootstrap replicas. We assume that the permanent and the transitory shocks remain constant within the period between two consecutive waves of the survey. To limit the number of parameters to be estimated and for stablity concerns, the σ_ϵ^2 in 2014 is supposed to be equal to the one in 2016. *significance at 0,1, ** significance at 0,05, *** significance at 0,01.

Table 3: Minimum Distance Partial Insurance Estimates

Parameters	Full sample	Owners	Tenants	North	South	Unemployed
ϕ_{it}	(1)	(2)	(3)	(4)	(5)	(6)
pre-dereg	0.617***	0.660***	0.373***	0.568***	0.676***	0.755***
	[0.05747]	[0.14365]	[0.29343]	[0.0730]	[0.02568]	[0.13972]
post-dereg	0.443***	0.40***	0.479***	0.406***	0.497***	0.544***
	[0.02194]	[0.02932]	[0.02953]	[0.02869]	[0.06261]	[0.06005]
ψ_{it}						
pre-dereg	0.254***	0.222**	0.386	0.239***	0.286***	0.316****
	[0.07843]	[0.11481]	[0.27916]	[0.04019]	[0.0035]	[0.08886]
post-dereg	0.288***	0.288***	0.335***	0.265***	0.354***	0.278***
	[0.02137]	[0.03041]	[0.06631]	[0.06141]	[0.0558]	[0.02823]
N.obs	38,899	28,559	7,006	17,305	13743	21,175

This table shows the estimation results of the partial insurance parameters. We allow these parameters to vary before and after the deregulation period. Standard errors are computed based on 50 bootstrap replicas. *significance at 0,1, ** significance at 0,05, *** significance at 0,01.

Table 4: Minimum Distance Partial Insurance Estimates

Parameters	Full sample	Owners	Tenants	North	South	Unemployed
	(1)	(2)	(3)	(4)	(5)	(6)
σ^2_ξ	0.012***	0.013***	0.009***	0.014***	0.009***	0.008***
	[0.0011]	[0.00118]	[0.0000]	[0.000131]	[0.000267]	[0.00114]
σ^2_u						
1989	0.035***	0.033***	0.023**	0.029***	0.031***	0.030***
	[0.00437]	[0.00631]	[0.01185]	[0.00136]	[0.00001]	[0.00636]
1991	0.042***	0.045***	0.047***	0.043***	0.045***	0.040***
	[0.00435]	[0.00641]	[0.00993]	[0.00761]	[0.00980]	[0.00482]
1993	0.041***	0.041***	0.038***	0.043***	0.036***	0.034***
	[0.00228]	[0.00455]	[0.00371]	[0.00572]	[0.00275]	[0.00485]
1995	0.032***	0.031***	0.034***	0.034***	0.034***	0.038***
	[0.00219]	[0.00222]	[0.00060]	[0.00155]	[0.00766]	[0.00044]
1998	0.043***	0.040***	0.050***	0.036***	0.051***	0.042***
	[0.00279]	[0.00223]	[0.00680]	[0.00167]	[0.00512]	[0.00130]
2000	0.032***	0.034***	0.034***	0.035***	0.038***	0.034***
	[0.00280]	[0.00257]	[0.00224]	[0.00447]	[0.00174]	[0.00394]
2002	0.043***	0.043***	0.041***	0.041***	0.054***	0.040***
	[0.00234]	[0.00271]	[0.00934]	[0.00492]	[0.00286]	[0.00226]
2004	0.045***	0.046***	0.046***	0.044***	0.054***	0.045***
	[0.00271]	[0.00305]	[0.00742]	[0.00226]	[0.00495]	[0.00013]
2006	0.029***	0.025***	0.032***	0.028***	0.030***	0.028***
	[0.00205]	[0.00169]	[0.00011]	[0.00029]	[0.00429]	[0.00083]
2008	0.020***	0.020***	0.027***	0.017***	0.023***	0.016***
	[0.00126]	[0.00089]	[0.00258]	[0.00225]	[0.00000]	[0.00048]
2010	0.025***	0.023***	0.029***	0.025***	0.024***	0.025***
	[0.00170]	[0.00081]	[0.00094]	[0.00247]	[0.00250]	[0.00146]
2012	0.029***	0.027***	0.036***	0.029***	0.028***	0.026***
	[0.00188]	[0.00146]	[0.00254]	[0.00318]	[0.00443]	[0.00352]
2014	0.042***	0.041***	0.042***	0.044***	0.042***	0.041***
	[0.00181]	[0.00152]	[0.00123]	[0.00221]	[0.00349]	[0.00157]
N.obs	38,899	28,559	7,006	17,305	13,743	21,175

This table shows the estimation results of the taste shock and of the measurement error of consumption. Standard errors are computed based on 50 bootstrap replicas. σ^2_u in 2014 is supposed to be equalt to σ^2_u in 2016. *significance at 0,1, ** significance at 0,05, *** significance at 0,01.

Table 3 reports the estimates of the partial insurance paramaters, both for the permanent and transitory components in two different points in time: in the period pre and post-deregulation respectively. Important quantitative differences arise between these parameters and their evolution over time and across the subsamples. With respect to the full sample (1), Italian households experienced an improvement in the insurance against permanent shocks from the period pre-deregulation to after the implementation of the banking reforms. Indeed, over these two different subsample periods the loading factor ϕ_{it} has decreased from 0.62 to 0.44. This means that the percentage of permament risk which was transmitted to consumption has significantly decreased around the same time of the banking reforms' implementation. The opposite and maybe surprising trend is observed with respect to the loading factor ψ_{it} which captures to what extent a percentage of transitory risk is transmitted to consumption (which should be easier to insure). The estimates clearly depict a slight increase between the subsample periods, from 0.25 to 0.29, suggesting a small worsening of the insurance capability against transitory shocks. A decrease in the parameter ϕ_{it} over time might be due to an improvement in the insurability for the households and/or to a qualitative difference in the persistence of the shocks. [19] Another possible reason has to be found in the sample composition and in the considerable amount of homeowners who can better finance and smooth their consumption over time via their housing (Benjamin et al., 2004) or through other forms of illiquid financial assets (mutual funds, retirement accounts). With respect to a better insurance ability/capability, we speculate that the reason why this might have happend are closely linked to a wider access to banking services and to the credit channel; to the allocation among the households of some new banking insurance products, as reinforced later on in 1998 by the *'Consolidated Act on Financial Intermediation (TUF)'* (which further expanded the range of banking sector's activities). Broadly speaking, households might have had the chance to borrow money to invest in illiquid real estate assets and be able to better smooth consumption against permanent income shocks, by using their housing wealth (Benjamin, 2004; Casado, 2010). To rely on this kind of illiquid wealth being accumulated over time (especially if house prices were increasing) may justify the higher degree of insurance with respect to permanent income shocks (decrease of the loading factor ϕ_{it}).

Fig.8 confirms the increasing trend of the net wealth of Italian households in terms of real estate (housing, land or other buildings). This is also consistent when the analysis is run on the subsample of home owners and tenants. While the first ones experience a substantial improvement in their insurance parameter against the permanent income shocks (with their ϕ_{it} dropping from 0.66 to 0.40, very similar to the full sample), the opposite is found in the subsam-

[19] Indeed, as already shown in Fig. 7, the predominant component of the income shocks has been the transitory one.

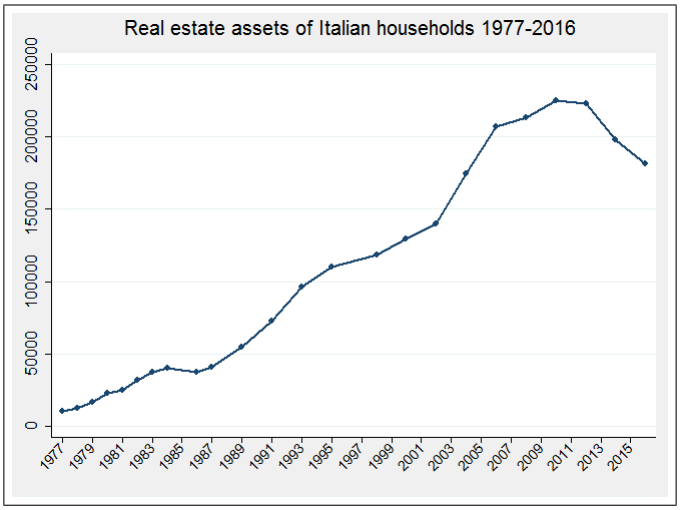

Figure 8: The figure shows the increase of the net wealth of the Italian households in terms of real estate assets (housing, land and other buildings). *Source*: Bank of Italy.

ple of the tenants, who experience, instead, an increase from 0.37 to 0.48 which translates into a higher transmission of the permanent shock to consumption. The ψ_{it} of owners' subsample increases over the two time windows, while for tenants there has been a decrease, from 0.38 to 0.33 (eventhoug the loading factor in the pre-deregulation period is not significant). However, this might be a sign of a relaxation of liquidity constraints - banks might have eased the lending activities, i.e. by requiring less amount of collateral -. An additional explanation may lie within the higher income risk of the tenants, which tends to favour the accumulation of rather liquid assets, 'better suited for the short-run consumption smoothing' and then considered as a better instrument of insurance to smooth out transitory income shocks (Bayer et al. 2015). This vast heterogeneity in the propensity to consume in presence of income shocks across the population is, indeed, mostly explained by the households' balance sheets and their wealth composition (Misra and Surico 2014).

The choice to compute and test whether the parameters may vary geographically, stems from the socio-economic polarization in Italy. 'At the beginning of the 1990's Italy resulted more clearly divided into two large regions than it was at the beginning of the 1950s' (Terrasi, 1999, page 508). Indeed, a dualism had taken place between the more dynamic and richer North and a poorer and underdeveloped South, even more remarkably since 1975, when a deeper and long-term tendency to diveregence has started.[20] This convergence might matter if it also reflects a different stage of banking system development and a diverse degree of accessibility

[20]The choice is somehow related to Santaeulàlia-Llopis and Zheng, 2017, where they estimate the 'partial insurance model' on two subsample: the rural and the urban areas in China between 1989 and 2009.

to banking services. These regions may differ in terms of banking supply side, as shown in Fig.9. The results in Table 3 (column 4 and 5) depict overall better insurance parameters across northern Italian households, compared to the ones living in Southern regions. However, the $\phi_{North,it}$ dropped from 0.57 to 0.40, while the $\phi_{South,it}$ has decreases from 0.67 to almost 0.50 in the period post-deregulation. This means that both types of households were better off in terms of degree of insurability against permanent income shocks. With respect to the transitory insurance parameter, there has been an increase around the time of banking deregulation. However, this variation was much bigger for the southern regions: $\psi_{South,it}$ has risen from 0.28 to 0.35, whilst the increase was more limited for northern regions. If we plot the decomposition of the variance for the north and the south, an interesting trend emerges: the transitory and the permament income shocks are much higher and volatile for the southern regions, while they are considerably more stable and flat for northern Italy (See Appendix, Fig. 20).

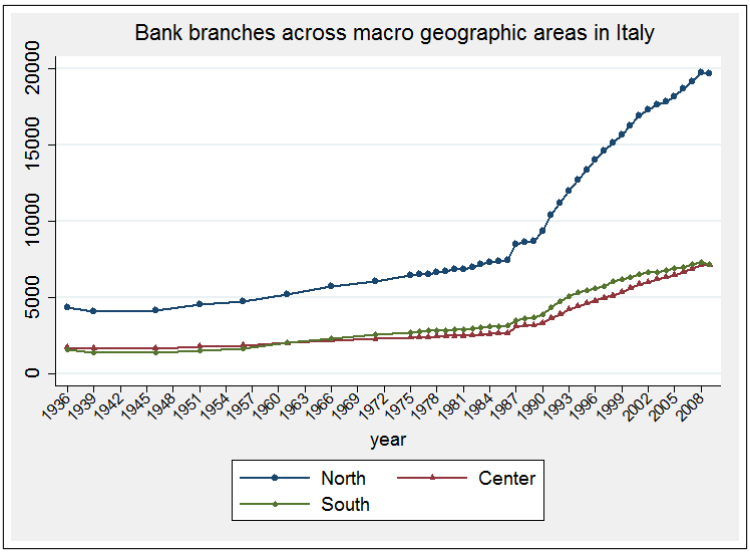

Figure 9: The figure shows the evolution of the amount of bank branches across macro areas in Italy, over time. *Source*: Bank of Italy.

If the sample is split by work status, some substantial differences arise. If we look at the 'Unemployed' head of households, an interesting result emerge: they experience a drop both with respect to ϕ_{it} and ψ_{it}. Many explanations might justify this result, such as the family network that might have worked as insurance channel (Laitner, 1997; Casado, 2010 among others) and especially in Italy where families represent a primary source of monetary help. Hence, if the credit channel and a wider access to banking services have taken place as a result of the implementation of banking reforms (Jappelli and Pistaferri, 2009; Guiso, Sapienza and Zingales, 2007), then the unemployed ones might have benefited indirectly by some family members,

who could rely to new borrowing opportunities. It is also worthy to mention the high level of shadow economy and the presence of a pervasive black market channel in Italy. Moreover, the role of public trasfers towards the unemployed might have been crucial to provide help and insurance.

Last table displays the σ_{ξ}^2 , the taste shift parameter, which represents 'all the unobservable factors that affect consumption choices and that we do not model or control for' (Attanasio, page 778), while σ_u^2 is the variance of error in consumption which is independent from the income process.To sum up, Italian households tend to partially insure both the transitory, and even more, the permanent income shocks.

It is not straightforward to conclude whether the market have become more complete in the aftermath of the banking deregulation. What is recorded is a significant drop in the permanent partial insurance parameter ϕ_{it} and a more limited increase in the partial insurance against transitory income shock, ψ_{it} (with the exceptions of some subsamples). The theory prescribes that, in presence of complete markets, transitory income shocks should exert no effect on consumption (Krueger and Perri, 2010). This is not confirmed in our analysis, which, on the contrary, shows how the loading factor ψ_{it} was not only different from 0 before the banking deregulation, but it slightly increased, worsening the insurance ability (1- ψ_{it}) in the post-deregulation period. However, banking deregulation might have exerted a more beneficial effect in the long-run. As shown in Fig.10 there has been a more dramatic variation (in absolute value) in the permanent insurance parameter ϕ_{it}, while a more limited one has been recorded with respect to the transitory insurance parameter ψ_{it} in the period immediately after the banking deregulation. The political economy channel might explain, to some extent, this pattern: 1992 was also a period of political turbulence, with the scandal of 'Tangentopoli' and 'Mani Pulite', dealing with political corruption among several politicians. This lack of strong institutional environment might have impeded the banking reforms to be fully effective and the transitory factor loading might have also reflected this temporary uncertainty (Claessens and Perotti, 2007).

6.2 Inequality gap and banking reforms

The last question this work aims to answer is whether the banking deregulation might explain the inequality gap (difference between the income and consumption inequality). Undoubtedly, many co-factors might help explaining this divergent pattern over time: a higher income inequality has been justified by Jappelli and Pistaferri (2011) as a direct consequence of an extensive deregulation of the labour market and of fixed term contracts (which weakened the bargaining power of the workers). However, this work points out the banking deregulation

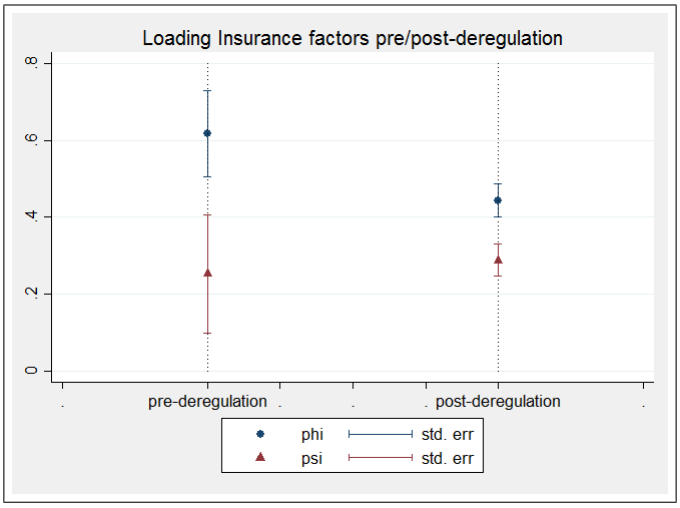

Figure 10: The figure shows the insurance factor loadings before and after the banking deregulation. *Source*: Author's elaboration with the Minimum Distance Estimator.

as an additional possible factor that might have influenced the ability of Italian households to smooth consumption against permanent and transitory income shocks.

The model being estimated fot this purpose is as follows:

$$Y_{it} = \beta_0 + \beta_1 * FinReform + \beta_2 * X_{it} + \mu_i + \nu_t + \epsilon \tag{13}$$

where Y_{it} is the inequality gap (defined as income inequality netting out consumption inequality); *FinReform* is the index of banking deregulation (higher values indicate more deregulation), X is a set of micro and macro controls (including education level, income quintiles, family size, age and its square, sector of employment, unenmployment rate, the gdp of each Italian macro region, the top tax income rate and the Employment protection index), μ_i denote the fixed effects and ν_t the time fixed effects. As shown in Table 5, to assess whether the banking deregulation might have contributed to widen the inequality gap, a fixed effect panel analysis has been carried out, relying on both micro and macro data. For the sake of brevity only the main results are shown (see Appendix for the full estimation results). As shown in regression (1), a 1 pp increase in the banking deregulation index (*finreform_index*) is associated with a 0.018 increase in the inequality gap. However, if we analysed the effect of the banking deregulation on each of the types of inequality, results become qualitatively different. Indeed, while the banking deregulation index is positevely associated to the income inequality, the reverse holds when we study the impact of the former on the consumption inequality. According to the results, banking deregulation, on the one hand, would widen the income inequality, perhaps by positively affecting the top income earners or just by empowering some groups (Tanndal

and Waldenström, 2016; Philippon and Reshef 2012; Larrain, 1989), while it would decrease the consumption inequality, maybe due to a higher access to the credit market, the relaxation of liquidity constraints and a widening of the extensive margin as documented in Guiso, Sapienza, Zingales (2006) and in Jappelli and Pistaferri (2009).[21]

Accordingly, the degree of accessibility to the banking market among the income deciles over time could be useful at this stage of the analysis to better clarify the mechanisms that might explain the gap between both consumption and income inequality (a better access to the credit market might, in principle limit the rise of the former). The perfect proxy for 'liquidity constrained' agents would be the dummy related to a question which has been asked to the households'heads of the survey: 'Has your credit request been refused by the bank?'. Though, the very limited amount of observations (especially around the time window event), does not permit to include it in the analysis. To overcome this issue, an alternative and more raw proxy that can be used to represent the 'banked' agents who have access to the market is the dummy 'debt card', which takes the valued of 1 if the agent owns at least a debt card, or 0 otherwise. It is, of course an imperfect proxy, as the decision of opening a bank account depends on the one hand by the willingness of the agents to do it. On the other hand, banks can shape the demand for deposits by making it more convenient and more affordable for the agents to sign the deal. At first glance what Fig. 11 highlights is the remarkable increase in the debt cards owner between 1989 and the early 1990's. After 1993, an inverse trend is reported, with a higher number of households holding at least a debt card (suggesting perhaps a broader access to banking intermediation for households). This is confirmed also in Fig.12, when for each quintiles of the income distribution the share of debt cards' owners is estimated at different points in time. This descriptive analysis might give useful insights to further investigate the link between banking deregulation and financial access. This question is, indeed, very interesting in its own right but a more detailed and deep study of it would take us too far afield in this work.

7 Discussion and shortcomings

The results reported in the previous section point out a genuine improvement of insurability against permanent income shocks after the banking deregulation and a somehow more uncertain increase, even tough limited, in the consumption response to transitory income shocks. Our results are to interpet in light of the previous works developed on the link between banking deregulation and households' response. Jappelli and Pistaferri explain, without empirically

[21] There is some empirical support to the hypothesis that firm shock changes, such as mergers, acquisitions, write offs migth significantly affect households' income.

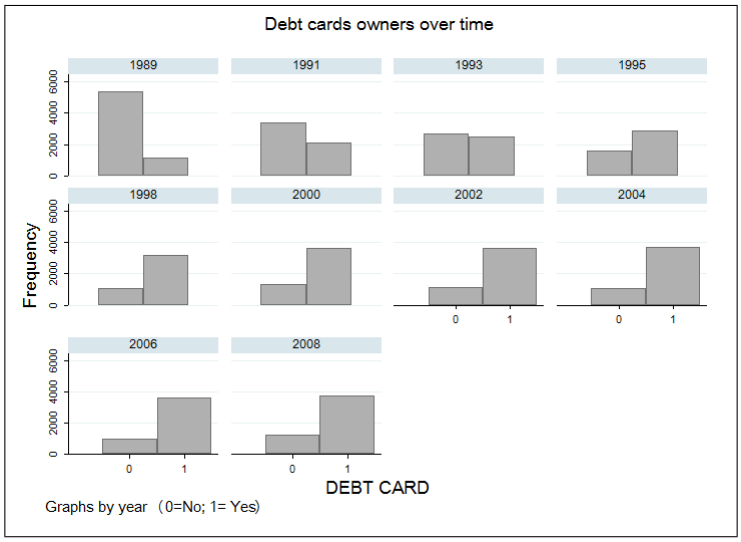

Figure 11: The figure shows the increase over time in the number of households owning at least a debt card. The dummy takes the value: 0=no debt card; 1=at least one debt card.

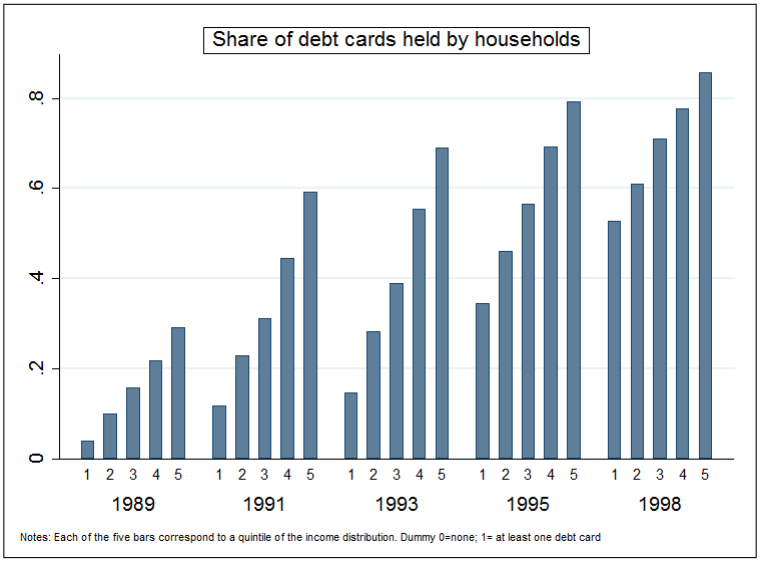

Figure 12: The figure shows the increase over time in the number avearge number of debt cards, for each income quintile. The dummy takes the value: 0=no debt card; 1=at least one debt card. Only the period immediately before and after the reforms (1990 and 1993) are taken into consideration. That is the reason why also the data in 1989 and 1995 are displayed.

Table 5: Inequality gap and banking deregulation

	Income_ineq	Consump_ineq	Gap_ineq
	(1)	(2)	(3)
finreform	0.020***	-0.001***	0.019***
	(0.00)	(0.00)	(0.00)
Constant	-3.101***	-3.013***	-6.114***
	(0.286)	(0.11)	(0.251)
Controls	Yes	Yes	Yes
FE	Yes	Yes	Yes
R-squared	0.865	0.583	0.881
N	63570	63570	63570

The regression shows the results of the analysis where each of the dependent variables are regressed on the financial deregulation index (Abiad, 2008) and a set of controls, including education level, income quintiles, family size, age and its square, sector of employment, unenmployment rate, the gdp of each Italian macro region, the top tax income rate and the Employment protection index (to take into account also the changes in the labour market and in the taxation system). Standard errors are clustered at household level. *significance at 0,1, ** significance at 0,05, *** significance at 0,01.

testing it, that Italian households have become very good at smoothing consumption, especially after the 1990's, time of the deregulation. The speculation on the improvement of insurance capability after the deregulation process in our work is somehow supported by a previous work of Guiso, Zingales and Sapienza (2007), who mention, among the pros of the aforementioned deregulation wave, a wider access to the credit market, a higher degree of financial inclusion (and a higher number of insurance products), which might be in line with an improvement in the ability of buffering mainly the permanent income shocks. Thus, the level of indebtness of the households has increased accordingly, which can perhaps justify the slight worsening in the insurability from transitory shocks. Indeed, there is empirical evidence that consumption response are higher among highly indebted households (Baker, 2014). In the short-run higher levels of debt (via the wider credit access and the relaxation of borrowing constraints) may become, for some households, an economic burden that is too heavy to keep up with and likely escalating into a higher level of non performing loans (as documented by Guiso, Zingales and Sapienza, 2007). Furthermore, banking deregulation might have indirectly affected the insurance ability of the unemployed households' heads through some spillover effects: it might have altered the lending pattern of the banks and/or easing the access to the credit channel for the small size companies (Demyanyk et al. 2006). Hence, this might have improved the conditions

of some unemployed, who could have been better off as a consequence of the higher labour demand that this efficiency gain in the credit channel might have created.

This work is, of course, not immune from limitations and shortcomings which future works are encourage to overcome. As highlighted by Krueger and Perri (2011) indeed, there might be some wealth shocks being correlated with the income ones, which jointly might affect the consumption's response of households. However, given the rather complex research question, we decided to adopt a more straightforward methodological approach, by focusing on the income shocks only. It would be perhaps interesting to incorporate different sources of both shocks and see whether and to what extent households react in terms of consumption adjustments and in which way institutional changes may affect them.

Furthermore, we do assume asimmetry in the consumption response of households to positive and negative income shocks. However, there is some empirical evidence wihich has found that consumption is affected more intensively by negative income changes, rather than positive income shocks and in presence of liquidity constraints, the MPC (Marginal Propensity of Consumption) distribution of negative income shocks dominates the MPC distribution of positive ones (Shea, 1995; Garcia et al. 1997, Christelis et al. 2017). This is, however, a more complex methodological set up which may be applied in future research.

The methodological framework of this analysis 'cannot distinguish between insurance mechanisms and differential information between the individual and the econometrician' (Jappelli and Pistaferri, 2010, page 501). Consequently, a low response or a decrease in the ϕ_{it} might be associated both to an improvement in insurance opportunities and/or to an advance information of the agents. Seemengly, we cannot completely disantangle the transitory component of inequality from the insurance capability of households against transitory income shocks. This means that transitory income shocks might have become harder to insure against relatively to the permanent component, despite the real improvement of the insurability brought by the banking deregulation.

The identification strategy of this work is based on the assumption that one of the main reasons why the parameters ψ_{it} and ϕ_{it} have significantly changed is the wave of banking deregulation. It could be argued, though, that other factors might have been contributed, e.g. insitutional change in the labour market (such as the most radical one, the Dini's Law in 1995 on pensions, the gradual creation of the dual labour market or the reduction of bargaining power of labour union).[22] It is not possible to disantangle clearly these effects in this kind of methodological framework and undoubtedly the estimate of ψ has been sensitive, to some degree, also to these other events. However, given the different timing of these reforms' im-

[22]Already in 1992 the Amato's Pension Law passed, which consisted of an increase of the retirement age. In addition, in 1993 the supplementary pension, or complementary protection system was also introduced.

plementation, we do believe it does not represent a main issue in this set-up. Market labour changes might have just contributed to increase the 'transitory' component of the variance of income. In other words, banking deregulation might have effectively improved insurance against the transitory income shocks but this more riskier transitory income process might dominate the genuine improvement in insurance ability of the households. Empirical evidence suggests that the effects of the lower bargaining power of workers (a direct consequence of the higher labour market flexibility) have been compensated by a wider access to the credit market (Tridico, 2012). Nevertheless, the aim of this work is to assess whether and to what extent financial insitutional changes might affect consumption smoothing and the insurability of households, given that many questions dealing with this topic have remained unexplored and unexplained for too long. This work places itself as a first attempt and merely as a starting point to directly connect the banking deregulation and the insurability of the households, which future works might further develop and improve.

This work does not distinguish according to the degree of liquidity of households' wealth, mainly due to lack of detailed data at the beginning of the sample period (we can just rely on the real assets wealth and the housing tenure proxy). However, this might be a crucial point, as there is some empirical evidence on how the marginal propensity to consume out of income shocks appears to be inversely related to the liquidity of the assets (its value is high if the amount of liquid assets is close to zero despite the illiquid wealth kept by the households) (see Fagereng, Holm and Natvik, 2016).

The heterogeneity exploited in this work and the different results which have emerged, suggest that models like the standard life-cycle model with perfect credit markets and infinite horizon, which assumes the same response of all agents to income shocks, are not suitable to explain the behavior of households. On the contrary, the precautionary savings motive and the assumption of liquidity constraints have started to question and challenge the standard assumptions and justify how different kinds of households might differently react in response to income shocks. This work attempts to exploit the high level of heterogeneity and, as more data will be available, it will be interesting to include them and shed light on consumption behaviors by further exploiting the composition of the households.[23] Similarly, due to the limited observations for some subsamples (income quintiles, sectors, birth cohorts) in the initial waves of the survey, it was not possible to estimate all the parameters of interest, as originally planned. Future works, which want to assess the impact of more recent financial and banking

[23]The high heterogeneity among sectors of employment might be an interesting dimension to explot. According to Christian (2015), financial integration may allow countries to specialize in specific industries, exposing themselves to higher vulnerability to industry-specific-shocks. This might be also true at a micro-level, where some households employed in specific sectors might be less or more vulnerable to particular shocks (through the labour channel).

deregulation on the consumption elasticities to income shocks, may exploit this heterogeneity at its fullest.

8 Robustness analysis

In this section we check if the results are robust with respect to a) different variable specification (in terms of income variables), by following the previous main literature (Blundell et all, 2008; Jappelli and Pistaferri, 2011; Santaeulàlia-Llopis and Zheng, 2017), such as the family earnings and the male earnings netting out the private transferts;[24] b) sample selection (by re-doing the analysis on those households being interviewed a higher number of consecutive waves [25].Results are reported in Table 6 and all the different specifications confirm the baseline results with respect to the factor loading ϕ, but the same does not hold for the parameter ψ. Indeed, in many of them the insurability against transitory income shocks appears to have improved after the deregulation, especially when the earnings with only public transfers are implemented as income variable. This is substantially different from the baseline results (which are based on a wider definition of disposable income). In this specification, indeed the consumption insurance against transitory shocks improves after the deregulation, decreasing from 0.39 to 0.25. This could be partly explained by the higher risk of some components of the baseline income (such as the business income). [26] There is, indeed, some evidence that personal savings and consumption react more strongly when the corporate sector distribute income with salaries, dividends and bonus compared to the accumulation of financial assets (Behringer and Van Treeck, 2013). This can also be explained by the higher sensitiveness of the business income to episodes of financial crisis. Hence, the baseline results might be more susceptible to the years of economic turbolences or business cycles.[27]

[24]There is empirical evidence that income inequality in Italy is higher if computed only on earnings, rather than on disposable income (Jappelli and Pistaferri, 2011, page 691).

[25]In the baseline model the number of consecutive observations for each individual is at least four, to allow for the identification (as in Santaeulàlia-Llopis and Zheng, 2017). This arbitrary choice imposes the assumption that the attrition must depend on fixed unobserved and observed characteristics and are independent from the actual shocks (Meghir and Pistaferri, 2004)

[26]Opposite qualitative results in the factor loadings between the baseline model and the one with 'earnings + public transfers' are also found in Santaeulàlia-Llopis and Zheng (2018).

[27]We could have easily avoid this issue by performing the analysis on a smaller time sample, disrigarding the years after 2006. However, this would have left us with a lower amount of observations and also waves to perform the robustness check.

Table 6: Alternative specifications

Parameters	Male HH	Earn+Publ	waves>8
ϕ_{it}	(1)	(2)	(3)
pre-dereg	0.576***	0.491***	0.497***
	[0.0330]	[0.0785]	[0.1409]
post-dereg	0.377***	0.404***	0.460***
	[0.0266]	[0.0228]	[0.0408]
ψ_{it}			
pre-dereg	0.259***	0.394***	0.259*
	[0.0956]	[0.1014]	[0.1470]
post-dereg	0.262***	0.259***	0.243***
	[0.0222]	[0.0246]	[0.0360]
N. obs	25,573	38,834	14,251

The sensitivity tests have been performed by re-doing the analysis on the male earnings subsamples, by restricting the income variables to only earnings and public transfers; by keeping the households with observations for at least 9 consecutive waves; by implementing the Equally-Weighted-Minimum-Distance estimator insetad of the Diagonally-Weighted-Minimum-Distance estimator.

9 Conclusion

This work analyses whether Italian banking deregulation in the early 1990's might have changed the response of households' consumption against permanent and transitory income shocks and to what extent it might have contributed to explain the inequality gap (defined as the difference between income inequality and consumption inequality) over time. As a natural experiment, for the purpose of this work, two banking reforms are taken into account: the *'Amato's banking Privatisation law'*in 1990 aiming at privatising the banking sector and the *'Consolidation banking law'* in 1993, which allowed the re-introduction of the *'quasi-universal* banks', by favouring a higher integration among commercial and investment banks. These banking reforms played a crucial role in shaping the banking structure and the credit markets. Since financial institutionals changes may matter in terms of economic decisions of households, it seems reasonable to investigate whether radical reforms in banking sectors can exert some effects on the consumption smoothing of households and the ability to insure against income shocks. The *Survey of households' income and wealth* (SHIW) provided by the Bank of Italy is employed to exploit the high degree of heterogeneity among households' heads, by using the waves from 1987 to 2016.

We disantangled the income variance in its permanent and transitory component; we esti-

mated the consumption insurance parameters against permanent and transitory income shocks for the full sample and for some subsamples in the period pre- and post-banking deregulation. The first important result is the substancial improvement in the consumption insurance against permanent income shocks in the period post-deregulation, from ϕ_{pre}=0.61 to ϕ_{post}=0.44 and a slight worsening of the partial insurance parameter against transitory shocks (from ψ_{pre}=0.25 to ψ_{post}=0.29), even though the latter has to be taken with caution since mixed results have been obtained across the subsamples.

Two potential explanations might justify these different trends: on the one hand, the transitory income variance has become the predominant component of the income inequality, by making harder to insure against it (perhaps due to the market labour changes since mid 1990's); on the other hand, the banking deregulation might have worked along the extensive fianancial margin, by easing the access to the credit channel and by providing the basic banking services, making the Italian households better at insuring persistent income shocks. Same qualitative results hold when the analysis is performed on subsamples, based on illiquid wealth (tenants versus owners) and on the macro-area od residency (north versus south). Hence, what can be said so far is that also Italian households underreact to permanent income shocks and overreact to transitory ones (Ochmann and Beznoska, 2012; Campbell and Mankiw, 1990). Their behaviour is slighlty different from Spanish households (Casado, 2011), who appear to react much less to transitory income shocks.

The last purpose of this analysis is to try to address whether the banking deregulation might also contribute to explain the inequality gap that has been widening over time in Italy. The analysis points out that banking deregulation has a widening effect on inequality gap. Howevere, if the analysis is applied separately on each type of inequality, we find a positive coefficient regarding income inequality (which increase), whilst a negative 'beta' with respect to consumption inequality, which may be perhaps considered as an indirect proof of the liquidity constraints' relaxation. This type of banking deregulation might have also allocated a wider range of insurance and financial products among the households. Unfortunately, due to the data limitation it was not possible to further investigate it, which imposes to leave this question to future research.

The results deliver some insights which might be useful from the policy standpoint: to aknowledge that institutional changes and financial reforms may dramatically affect the insurance ability of households and, consequently, the more general level of inequality, is important to design better policies aiming not only at boosting the financial sector's productivity, but also at making each household perfectly capable to smooth income shocks in the short and long-run. The effects of this kind of banking structural reforms might affect households' behaviour in different ways, given the high degree of heterogeneity among them.

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Appendix

The banking and regulatory background in Italy.[28]

This particular package of financial reforms included the so-called 'Privatisation banking law' in 1990 and the the Banking Act (Legislative Decree n.385/1993). They repealed the 'Banking Law', an act previously enacted during fascist dictatorship, which had separated commercial and investment banks since 1936, by strictly regulating the banking system with the aim to nationalize it and exploit it to serve purposes' government. Furthermore, this previous Act classified the different types of banks which, though, were all state-owned. One of the major changes which the 'Privatisation Law' and even more the TUB led to, was the gradual privatization of banking system (or at least a coexistence of state owned and private banks), the abolition of branches restrictions but the most remarkable innovation was the reintroduction of quasi-'universal banks' (Section 10). [29]. 'Italy's banking sector has managed to transform itself from a largely state-owned system to a much more dynamic and efficient sector' (Hagendorff, 2007, page 200).

The reforms also set specific provisions about bank's ownership in order to pose limits to the shares of banks that could be owned by industrial companies, without completely prohibiting these participations (Sections 19-24).[30] Eventually three different types of banks were created: ordinary banks with the legal form of corporations and two different kinds of banks chartered as cooperatives (banche popolari and banche di credito cooperativo, which were the old 'rural banks'). They were allowed, because of this reform, to own subsidiaries involved in different financial activities. In other words, this particular intervention, aimed at deregulating the financial service sector, encouraged a higher integration among commercial and investment banks. As a consequence, the banking system has become much more concentrated over time.[31] The M&As undertaken between 1990 and 2000 involved more than 46% of the Italian banking system (Messori, 2001). The amount of banks fell by 28% between 1990 and 2002 and by 37,5% by extending the period till 2012, but the level of banking assets increased significantly (even

[28]This subsection is taken from Casti, II Chap., 2018

[29]The form of universal bank as alternative banking structure has been partly anticipated by the II Banking Directive of 1989, which defined it as a model for the European banking industry

[30]In 1998 the *'Consolidated Act on Financial Intermediation (TUF)'* passed (in adoption of the European Directive n. 22/93). This act expanded further the range of banks' activities, which could have undertaken investment services, beyond the traditional ones. Our analysis has not focused on this reform, since the reform package of 1990-1993 has been crucial to deeply change the banking structure. However, the TUF might have increased even further the profit margins and empowered the speculative channel.

[31]See Hagendorff et al. (2007) on the link between financial deregulation in banking sector and consolidation acitivities.

though in some countries, such as US this trend has become much more remarkable). The top five largest banks hold over half of the Italian banking industry's assets, and the top three over the 40% of total assets. One third of the operative banks in 1990 no longer exists (Coletti and Corona, 2004). Fig 13 shows exactly this trend, by reporting the growth rates of the number of banks over time. This higher banking concentration may affect the income distribution. Ham-

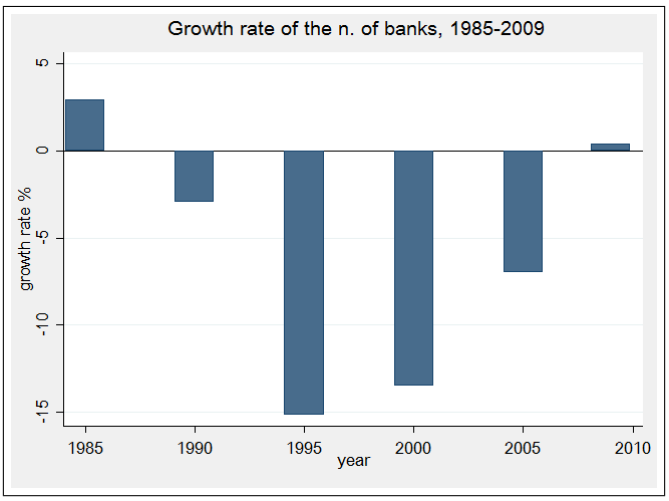

Figure 13: Growth rates of the number of banks over time. Source: Bank of Italy.

mond (1957) argued that big banks would disproportionally help the wealthy and the rich and, consequently, the income distribution would widen. Put differently, banks which are too big may also be 'too big for all' and only a few (the rich) can benefit.[32].

Moreover, changes in competition, following deregulation, may affect firms' profits, the bargaining power and the incentives for executives to extract rents from the companies (Bebchuck et al., 2002). Furthermore, this kind of structural policies might affect the banking income margins and their composition. Indeed, while during the 80's, the growth rate of the margins experieced in the traditional banking activities was much higher than the non-interest income growth, in the 90's the trend was reversed. This new pattern may validate the effect exerted by the banking structural deregulation with respect to financial institutions and the credit market. The increase in the non-interest income might reflect the shift of the banking sector to more capital-oriented activities (such as asset management, underwriting, advisory services and trading). One of the possible reason of this shift has been identified by Hackethal and Schmidt (2005) in the rise of big investment banks, and consequently, in a new and more prof-

[32]Other potential factors for the rise of investment banking power are pension funds (they were responsible to start securities demand, supplied by investment banks); ICT (cut information and operational cost, leading to a higher turnover), (Wójcik, 2011)

itable (speculative) range of activities.

Identification strategy

As already explained in the Methodology section, the partial insurance model a la Blundell et al. (2008) is estimated, with an income process defined as an AR(1) for the permanent component and a i.i.d transitory shock.[33] After having regressed the log of income and consumption on a set of controls for each year of the wave, the residuals of both income and consumption are used to compute the first differences of the variables of interest $\Delta_\tau \kappa$, namely $\kappa_t - \kappa_{t-\tau}$. Hence, we have $\Delta_2 y1989$, $\Delta_2 y1991$, $\Delta_2 y1993$, $\Delta_2 y1995$, $\Delta_3 y1998$, $\Delta_2 y2000$, $\Delta_2 y2002$, $\Delta_2 y2004$, $\Delta_2 y2006$, $\Delta_2 y2008$, $\Delta_2 y2010$, $\Delta_2 y2012$, $\Delta_2 y2014$, $\Delta_2 y2016$; $\Delta_2 c1989$, $\Delta_2 c1991$, $\Delta_2 c1993$, $\Delta_2 c1995$, $\Delta_3 c1998$, $\Delta_2 c2000$, $\Delta_2 c2002$, $\Delta_2 c2004$, $\Delta_2 c2006$, $\Delta_2 c2008$, $\Delta_2 c2010$, $\Delta_2 c2012$, $\Delta_2 c2014$, $\Delta_2 c2016$. We also follow Santaeulàlia-Llopis and Zheng (2018) in assuming that the model might be treated as if it was annual (even though the consumption and income growth are available always for τ equal or bigger than 2 and not on a annual basis, as in Blundell et al. (2008). However, if we suppose that between t and τ, the loading factors ψ and ϕ remain constant, it is still possible to express the income and consumption growth as follows:

$$\Delta_\tau y_t = y_t - y_{t-\tau} = \sum_{j=t-\tau+1}^{t} \zeta_j + \epsilon_t - \epsilon_{t-\tau}$$

$$\Delta_\tau c_t = \phi_t \sum_{j=t-\tau+1}^{t} \zeta_j + \psi_t \sum_{j=t-\tau+1}^{t} \epsilon_j + \sum_{j=t-\tau+1}^{t} \zeta_j + u_{c,t} - u_{c.t-\tau}$$

The non-zero elements in the auto-covariance matrix of the income growth are:

$$E[\Delta_\tau y_t^2] = \sum_{j=t-\tau+1}^{t} \sigma^2_{\zeta_j} + \sigma^2_{\epsilon_t} + \sigma^2_{\epsilon_{t-\tau}}$$

$$E[\Delta_{\tau 1} y_t \Delta_{\tau 2} y_{t+\tau 2}] = -\sigma^2_{\epsilon_t}$$

The non-zero elements in the auto-covariance matrix of the consumption growth are:

$$\Delta_\tau c_t^2 = \phi_t^2 \sum_{j=t-\tau+1}^{t} \sigma^2_{\zeta_j} + \psi_t^2 \sum_{j=t-\tau+1}^{t} \sigma^2_{\epsilon_j} + \tau \sigma^2_{\zeta} + \sigma^2_{u,t} + \sigma^2_{u,t-\tau}$$

[33] The results for the estimation of the income process are availbale upon request. The ρ has been estimated and is equal to 1.09. In addition, the pattern of the transitory and permanent component of inequality is quite similar to the graph shown in Fig.7.

$$E[\Delta_{\tau 1} c_t \Delta_{\tau 2} c_{t+\tau 2}] = -\sigma^2_{u_t}$$

The non-zero elements in the auto-covariance matrix of the income and consumption growth are:

$$E[\Delta_\tau c_t \Delta_\tau y_t] = \phi_t \sum_{j=t-\tau+1}^{t} \sigma^2_{\zeta_j} + \psi_t \sigma^2_{\epsilon_t}$$

$$E[\Delta_{\tau 1} c_t \Delta_{\tau 2} y_{t+\tau 2}] = -\psi_t \sigma^2_{\epsilon_t}$$

Hence, by manipulating the data we get an equivalent model explained in the Methodology section, with the only time span difference in between the waves:

$$E[\Delta_{\tau 2} y_{t+\tau 2}(\Delta_{\tau 1} y_t + \Delta_{\tau 2} y_{t+\tau 2} + \Delta_{\tau 3} y_{t+\tau 2+\tau 3})] = \sum_{j=t+1}^{t+\tau 2} \sigma^2_{\zeta_j}$$

$$E[\Delta_{\tau 2} c_{t+\tau 2}(\Delta_{\tau 1} y_t + \Delta_{\tau 2} y_{t+\tau 2} + \Delta_{\tau 3} y_{t+\tau 2+\tau 3})] = \phi_{t+\tau 2} \sum_{j=t+1}^{t+\tau 2} \sigma^2_{\zeta_j}$$

The variance of permanent income shocks and the permanent factor loading are simultaneously identified:

$$\frac{E[\Delta_{\tau 2} c_{t+\tau 2}(\Delta_{\tau 1} y_t + \Delta_{\tau 2} y_{t+\tau 2} + \Delta_{\tau 3} y_{t+\tau 2+\tau 3})]}{E[\Delta_{\tau 2} y_{t+\tau 2}(\Delta_{\tau 1} y_t + \Delta_{\tau 2} y_{t+\tau 2} + \Delta_{\tau 3} y_{t+\tau 2+\tau 3})]} = \phi_{t+\tau 2}$$

While the variance of transitory income shocks is defined as:

$$\frac{E[\Delta_{\tau 1} c_t \Delta_{\tau 2} y_{t+\tau 2}]}{E[\Delta_{\tau 1} y_t \Delta_{\tau 2} y_{t+\tau 2}]} = \psi_t \sigma^2_{\epsilon_t}$$

Additional descriptive statistics and graphs.

A comparison of kernel density estimations with respect to 1987 (pre-deregulation) and 1993 (post-deregulation) is reported in Fig. 14. The distribution has experienced a rigt shift, indicating that the mean sample has increased over time. Fig.15 and Fig.16 report both the consumption and income dynamics in level over time, by exploiting the heterogeneity of households in terms of education and also employment sector.

The higher is the level of education the higher the gap between income and consumption level, suggesting perhaps a higher amount of savings for the most educated individuals. Fig.16 reports the composition of financial assets and liabilities for each decile of the income distribution. Fig.19 shows instead the predictive margins of the probability of owning a debt card, for a given income decile. As shown, the relationship depicted appear to be monotonic, with

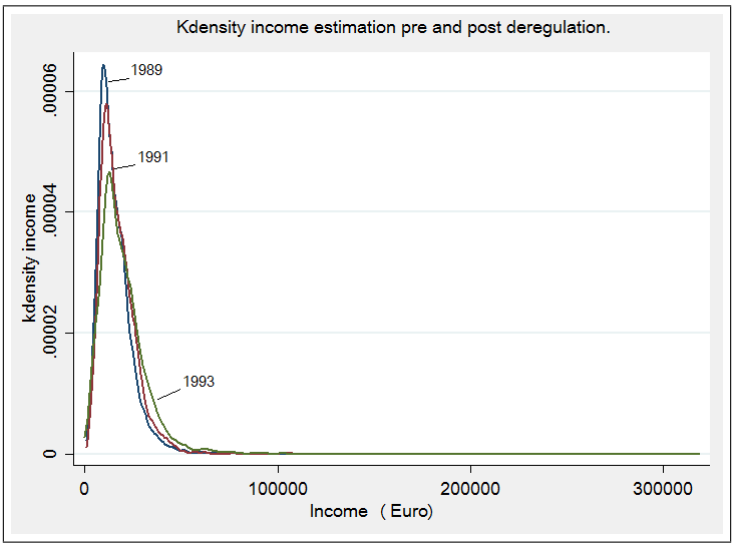

Figure 14: Kernel density estimation immediately before the banking deregulation and after.

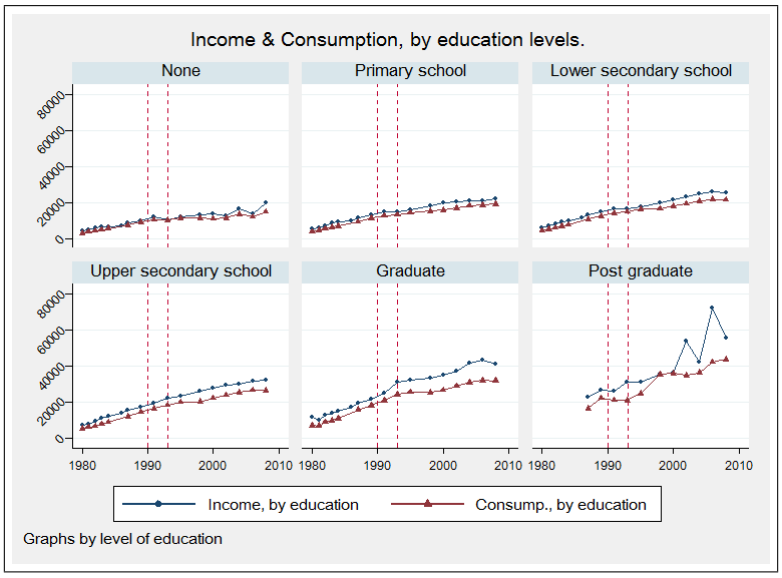

Figure 15: Dynamics of income and consumption levels over time, disaggregating by education level.

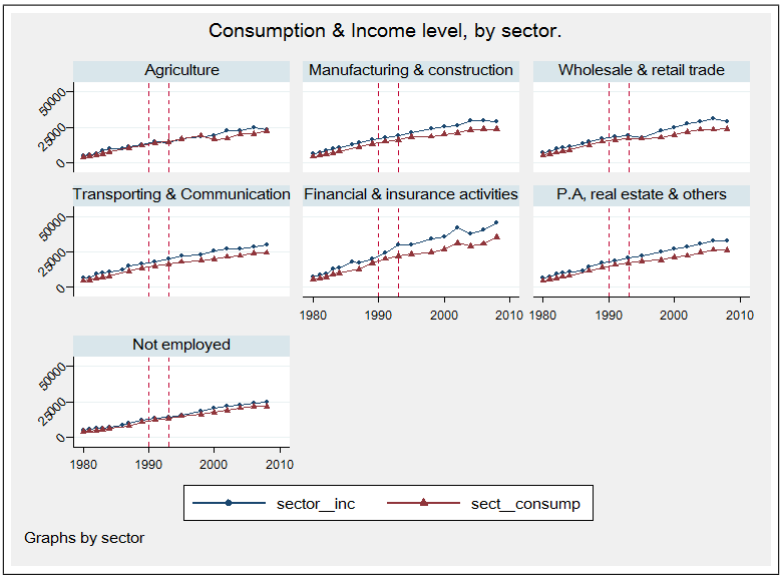

Figure 16: Dynamics of income and consumption levels over time, disaggregating by employment sector.

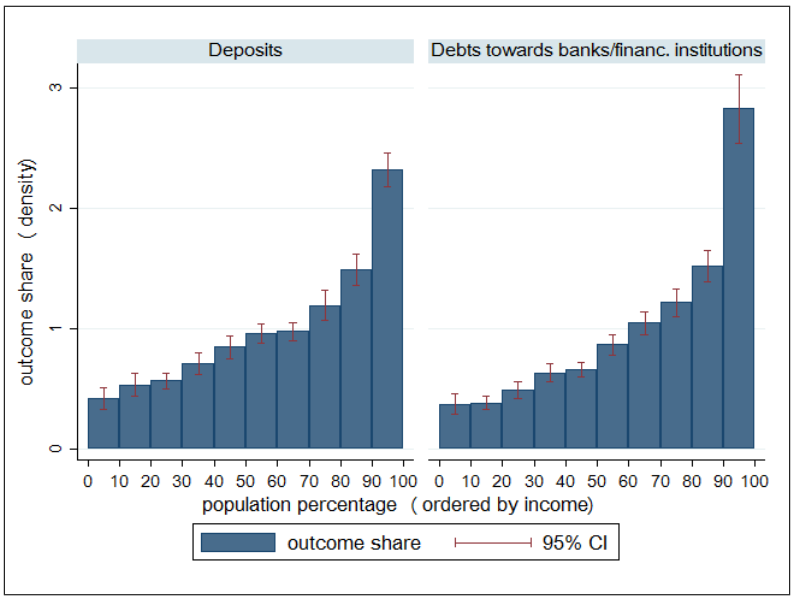

Figure 17: Financial assets and liabilities, by income deciles. Bank and post deposits are identified as financial assets, while debts towards banks and other financial institutions as financial liabilities.

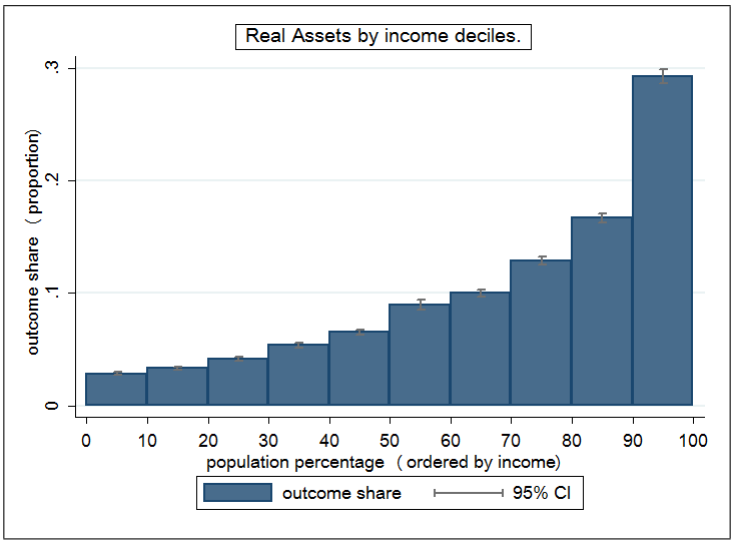

Figure 18: Real high illiquid assets by income deciles. In this case only the value of the houses and land are considered (netting out the values of companies and others valuables.

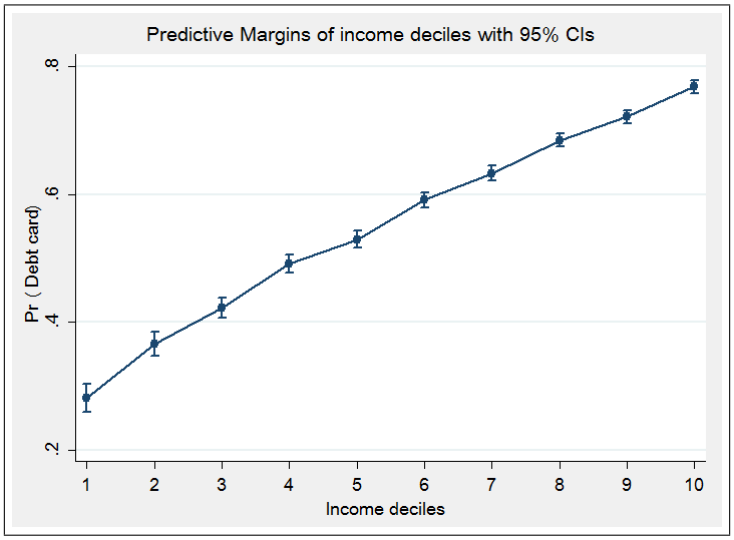

Figure 19: The figure shows a the predictive margins of the income deciles on the probabilty of owning at least a debt card.

higher level of income associated to a higher probability to possess at least one debt card.[34]

In Fig. 20 the different income process estimated for the subsamples of households living in North and South are display graphically. As shown, those ones living in the southern Italy tend to have a higher level of both permanent and transitory inequality, while a more stable pattern is found if we look at Italian households living in northern Italian regions.

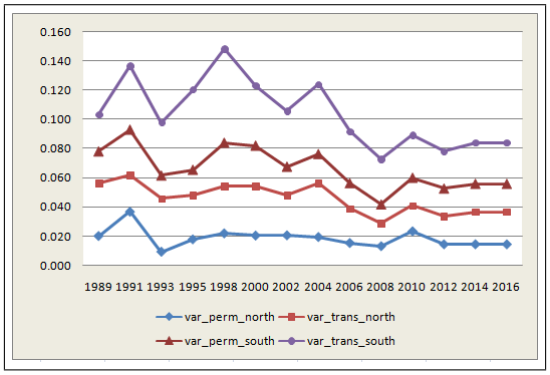

Figure 20: The figure shows the decomposition of the variance of the income process across macro areas in Italy, over time. *Source*: Bank of Italy.

[34]This graph has been created by running a probit regression having as dependent variable the dummy 'debt card' on a set of households' specific covariates such as, age, age^2, size of the family, education, geography, employment sector, income deciles and time dummies of the bank reforms.

In Table 6 the full results of the FE panel analysis are reported.

Table 7: (Full) Results: Inequality gap and banking deregulation.

	Income_ineq	Consump_ineq	Ineq_gap
	(1)	(2)	(3)
finreform	0.020***	-0.001***	0.019***
	(0 .00)	(0 .00)	(0 .00)
log_pop	0.174***	0.215***	0.389***
	(0.018)	(0.007)	(0.016)
age	-0.001***	0.000***	-0.000***
	(0 .00)	(0 .00)	(0 .00)
age2	0.000	0.000	0.00
	(0 .00)	(0 .00)	(0 .00)
SETTP=2	-0.002	0.001	-0.001
	(0 .00)	(0 .00)	(0 .02)
SETTP=3	0.00	0.00	-0.001
	(0.001)	(0.001)	(0.001)
SETTP=4	-0.003	0.001	-0.002
	(0.002)	(0.001)	(0.001)
SETTP=5	0.000	0.001	0.00
	(0.002)	(0.001)	(0.002)
SETTP=6	-0.003*	0.001	-0.002*
	(0.001)	(0.001)	(0.001)
SETTP=7	-0.003*	0.001	-0.002*
	(0.001)	(0.001)	(0.001)
educ=2	-0.002	0	-0.002*
	(0.001)	(0.001)	(0.001)
educ=3	-0.008***	0.001*	-0.007***
	(0.001)	(0.001)	(0.001)
educ=4	-0.012***	0.003***	-0.009***
	(0.002)	(0.001)	(0.001)
educ=5	-0.015***	0.004***	-0.012***
	(0.002)	(0.001)	(0.002)
educ=6	-0.014***	0.005*	-0.009*
	(0.004)	(0.002)	(0.004)
fam_size=2	0.002*	-0.001**	0.001

Table 7: (Full) Results: Inequality gap and banking deregulation.

	Income_ineq	Consump_ineq	Ineq_gap
	(0.001)	(0.001)	(0.001)
fam_size=3	0.004***	-0.001**	0.003**
	(0.001)	(0.001)	(0.001)
fam_size=4	0.004***	-0.001**	0.003***
	(0.001)	(0.001)	(0.001)
fam_size=5	0.008***	-0.002***	0.006***
	(0.001)	(0.001)	(0.001)
fam_size=6	0.010***	-0.003***	0.007***
	(0.002)	(0.001)	(0.002)
fam_size=7	0.010***	-0.003	0.008**
	(0.003)	(0.001)	(0.003)
fam_size=8	0.009	-0.004	0.005
	(0.005)	(0.002)	(0.004)
fam_size=9	0.014	-0.003	0.011**
	(0.007)	(0.004)	(0.004)
gdp_region	-0.000***	0.000***	-0.000***
	(0.00)	(0.00)	(0.00)
epl	-0.159***	0.164***	0.005
	(0.003)	(0.001)	(0.003)
TopIncomeTaxRate	0.932***	-0.777***	0.155***
	(0.015)	(0.005)	(0.013)
unemploymentrate	-0.001***	-0.003***	-0.005***
	(0.00)	(0.00)	(0.00)
Constant	-3.101***	-3.013***	-6.114***
	(0.286)	(0.11)	(0.251)
R-squared	0.865	0.583	0.881
N	63570	63570	63570

The regression shows the results of the analysis where each of the dependent variables are regressed on the financial deregulation index (Abiad, 2008) and a set of controls, including education level, income quintiles (cly2), family size, age and its square, sector of employment (settp), unenmployment rate, the gdp of each Italian macro regio, the top tax income rate and the Employment protection index, 'epl' (to take into account also the changes in the labour market and in the taxation system). Standard errors are clustered by household levels. *significance at 0,1, ** significance at 0,05, *** significance at 0,01.

General conclusions and open questions.

Studying the link between inequality and financial development has gradually gained considerable attention among academics and the public opinion. In this work I have investigated this link by adopting different perspectives and methodologies, to give insights and shed further light on this link.

Policywise, this work provides the reader with some food for thought for the ongoing debate, whether finance might be a potential weapon for the income inequality. It is not so straightforward to address this complex question, however, this work has highlighted some important aspects. First, credit channel to the private sector appears to play a crucial role in determining the level of inequality: for low and intermediate level of it, the effect of financial intermediation might contribute positively to reduce inequality. Nevertheless, for (too) high level of credit, inequality is boosted, which is in line with the increase in income growth rates especially in developed economies. It matters whom the financial institutions lend resources to and future research is strogly encouraged to study more thoroughly these implications. It is important who gets the credit, and even more for which purposes they do it.

Besides, it is crucial for policymakers to realise the importance that any structural change within the financial institutions (such as privatisation, mergers and acquisitions, bank branch regulations, degree of competition), can have dramatic effects in terms of income distribution, in this specific case on the top income earners, who appear to be winning from this pervasive change within financial sector. Two specific channels deserve further attention, the speculative one and the bank margins deriving from non-traditional activities (non-interest income). Unfortunately, it has not been possible to investigate the effects on the bottom income distribution (given limited availability of data). It seems to be then an open question for future research. Indeed, is banking deregulation good only for the right tail of the income distribution or did it actually allow the bottom income earners to get more credit and access along the extensive financial margin?

A useful reminder is that banks and households are not disconnnected entities, but instead they interact with each other. Hence, credit markets and banking sector might considerable affect households' behaviours, in terms of insurability and consumption smoothing. Italian households seem to have benefited from this deregulation wave (at least in terms of insuring against permanent income shocks). This represent a first attempt to assess the role of financial institutional changes on the insurane capability. It would be interesting to evaluate similar banking reforms in other economies, to be able to generalize whether these effects are country specific or the reforms exert the same effects worldwide. Besides, the widening gap between income and consumption inequality in Italy has been partly explained by the banking deregulation of the early 1990's. Future research is strongly advocated to investigate whether this lower level of consump-

tion inequality could be justified with an improvement along the extensive margin and a wider banking capacity to lend resources to the different deciles of the population.

Understanding the implications of having more developed financial systems is crucial to get insights in terms of resource allocations, (top) income inequality and insurability, but also in terms of financial stability. Changes in financial systems have real implications on many levels. The pursuit of efficiency and productivity in financial sector should be always accomplished by keeping in mind its linkages with the real economy.