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Finance and income inequality: A review and new evidence

Jakob de Haan[a,b,c,d], Jan-Egbert Sturm[c,d,*]

[a] De Nederlandsche Bank, Amsterdam, The Netherlands
[b] University of Groningen, The Netherlands
[c] KOF Swiss Economic Institute, ETH Zurich, Switzerland
[d] CESifo Munich, Germany

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ABSTRACT

Using a panel fixed effects model for a sample of 121 countries covering 1975–2005, we examine how financial development, financial liberalization and banking crises are related to income inequality. In contrast with most previous work, our results suggest that all finance variables increase income inequality. The level of financial development conditions the impact of financial liberalization on inequality. Also the quality of political institutions conditions the impact of financial liberalization on income inequality, in contrast to the quality of economic institutions. Our main findings are robust for using random effects, cross-country regressions and legal origin as instrument for financial development.

1. Introduction

Rising income inequality is a widespread concern. Former US President Obama even called widening income inequality the "defining challenge of our time" (Dabla-Norris et al., 2015). Income inequality within most advanced, emerging markets and developing countries has increased, but there is no consensus yet about its causes. One factor that has received a lot of attention in recent literature is the impact of finance on income inequality.[1] However, there are conflicting views about the relationship between finance and income inequality. To some extent these differences reflect that studies focus on different dimensions of finance. For instance, several papers focus on the impact of financial development on income inequality, while others examine the impact of financial liberalization on income inequality. As pointed out by Abiad et al. (2008), a proper distinction between financial liberalization and financial deepening is often not made in the literature even though they are different concepts. Financial liberalization refers to a reduction in the role of government and an increase in the role of financial markets, while financial development refers to an increase in the volume of financial activity (Abiad et al., 2008).

Financial liberalization is most often measured by the financial liberalization index of Abiad et al. (2010), which summarizes de jure changes in credit controls, interest rate controls, entry barriers for banks, regulations, privatization, and restrictions on international financial transactions, while financial development is mostly measured by credit to the private sector relative to GDP. Although these two dimensions of finance tend to be related, (as pointed out by Abiad et al. (2010), financial liberalization, for instance, enables financial development) they are not equivalent: a country with a high score on one dimension does not necessarily score high on the other dimension.

* Corresponding author at: KOF Swiss Economic Institute, ETH Zurich, Switzerland.
E-mail address: sturm@kof.ethz.ch (J.-E. Sturm).

[1] See Claessens and Perotti (2007) and Demirgüç-Kunt and Levine (2009) for excellent reviews of the literature.

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In addition to financial development and financial liberalization, we also consider a third dimension of finance, namely banking crises. There are several databases of banking crises (Chaudron and de Haan, 2014), which identify a banking crisis based on exceptional events or policy interventions, such as bank closures, deposit freezes and government rescues. It is important to also consider the impact of this dimension of finance on income inequality. As will be explained in further detail in Section 2, several studies conclude that financial development and liberalization reduce income inequality. However, financial development and liberalization may be related to financial crises, which will also affect inequality.[2] Wealth losses due to a financial crisis probably will hit the top of the income distribution. However, low-income individuals will be hit more if the financial crisis is followed by an economic downturn (which is not always the case). Indeed, according to the OECD (2013), during the global financial crisis the average market income inequality across OECD countries increased by 1.4 percentage points. To properly assess the impact of finance on income inequality it is therefore important to also take the impact of banking crises on income inequality into account.

We examine the relationship between three dimensions of finance, i.e. financial development, financial liberalization and banking crises, and income inequality using panel fixed effects regressions for a large sample of countries, thereby focusing on within-country developments of income inequality. As dependent variable we use five-year averages of Gini coefficients based on households' gross income from Solt's (2009) Standardized World Income Inequality Database (SWIID).

In our analysis we take into account that the relationship between financial development and financial liberalization on the one hand and income inequality on the other may be non-linear. Several studies have suggested two factors that may condition the relationship between these dimensions of finance and income inequality. First, institutional quality may condition the relationship between finance and income inequality. According to Rajan and Zingales (2003), in weak institutional environments established interests have privileged access to finance so that financial development induced by captured direct controls is likely to hurt the poor. In the presence of strong institutions, financial development may reduce inequality, allowing the poor to invest in human and physical capital (Law et al., 2014). A similar argument can be made for financial liberalization (Delis et al., 2014).[3] We therefore examine whether the quality of economic and political institutions conditions the impact of financial development and financial liberalization on income inequality.

Second, Bumann and Lensink (2016) suggest that the impact of financial liberalization on inequality is conditioned by financial development. In their view, financial liberalization will improve income distribution in countries where financial depth is high. [4] We will therefore examine whether financial development conditions the impact of financial liberalization on income inequality.

Our contribution to the literature is threefold. First, we include financial development, financial liberalization and financial crises in our empirical analysis of the relationship between finance and income inequality. Except for Li and Yu (204), previous studies include at best two of these variables at the same time (see Section 2 for details). Second, we use different indicators of financial liberalization. Like previous studies we use the financial liberalization data of Abiad et al. (2010), but also construct an alternative indicator based on some components of the economic freedom index of the Fraser Institute (Gwartney et al., 2015). This enables us to check how sensitive results are for the way financial liberalization is measured. Third, we examine whether the impact of finance on income inequality is conditioned by: (1) the level of financial development as suggested by Bumann and Lensink (2016); and (2) institutional quality as suggested by Rajan and Zingales (2003).

Our results suggest that a higher level of financial development, financial liberalization and the occurrence of a banking crisis all increase income inequality in a country. In contrast to the prediction by Bumann and Lensink (2016), our results suggest that with high levels of financial development, financial liberalization increases income inequality. We also find evidence that, unlike the quality of economic institutions, the quality of political institutions conditions the impact of financial liberalization on income inequality: with higher levels of democratic accountability the positive effect of financial liberalization on inequality increases. Institutional quality does not condition the impact of financial development on income inequality, in contrast to the prediction by Rajan and Zingales (2003).

The remainder of the paper is structured as follows. Section 2 discusses related studies in more detail. Section 3 describes our methodology and data used, while Section 4 presents the main results. Section 5 offers a sensitivity analysis and Section 6 concludes.

2. Literature review

2.1. Financial development and income inequality

There is an extensive literature on the relationship between financial development and income inequality. As pointed out by Demirgüç-Kunt and Levine (2009), theory provides ambiguous predictions for the impact of financial development on income distribution. A distinction can be made between the effects of finance on the extensive and the intensive margin. The extensive margin is about the use of financial services by individuals who had not been using those services. Financial imperfections, such as information and transaction costs, may be especially binding on the poor who lack collateral and credit histories so that relaxation of

[2] According to Ranciere et al. (2008), financial liberalization is typically followed by boom–bust cycles. During the boom, bank credit expands very rapidly (i.e. a strong increase in financial development) and excessive credit risk is undertaken. As a result, the economy becomes financially fragile and prone to crisis. See also Abiad et al. (2010) and Furceri and Loungani (2015) for further discussion.

[3] Delis et al. (2014, p. 1824) argue that "quality institutions might enhance the impact of regulations on the distribution of income and weaker institutions may undermine such an impact." However, they do not examine this. The present study therefore is the first to examine whether the impact of financial liberalization on income inequality is conditioned by institutional quality.

[4] Bumann and Lensink (2016) provide some empirical evidence in support of their model. However, their proxy for financial liberalization is the extent to which the capital account is liberalized, which is only one of the items taken into account in the financial liberalization index of Abiad et al. (2010).

these credit constraints may benefit the poor (Beck et al., 2007). Inequality falls in models with this mechanism (Galor and Moav, 2004).[5] The effect of financial development on income inequality on the intensive margin is different. Improvements in the quality and range of financial services do not tend to broaden access to financial services, but instead improve the quality of financial services enjoyed by those already purchasing financial services (Greenwood and Jovanovic, 1990). The benefits of these intensive margin effects accrue primarily to the rich, widening the distribution of income.

The link between theory and empirical research in this line of research is rather weak. Theory is only used to come up with hypotheses about the sign of the relationship between financial development and income inequality. Unfortunately, the extensive empirical literature on the relationship between financial development and income inequality provides very mixed findings.[6] Table A1 in the Appendix provides a detailed survey of all studies that we are aware of. As the table shows, most studies use private credit divided by GDP to proxy financial development. This measure excludes credit to the central bank, development banks, the public sector, credit to state-owned enterprises, and cross claims of one group of intermediaries on another. Thus, it captures the amount of credit channeled from savers, through financial intermediaries, to private firms. It has advantages over alternative measures of financial development, such as M2 over GDP, which does not measure a key function of financial intermediaries, which is the channeling of society's savings to private sector projects (Beck et al., 2007).

Most studies report that countries with higher levels of financial development have less income inequality (see e.g. Li et al. 1998, Clarke et al., 2006, Beck et al., 2007, Kappel, 2010, Hamori and Hashiguchi, 2012, Agnello and Sousa, 2012, Kunieda et al., 2014, and Naceur and Zhang, 2016). However, other studies report a non-linear relationship due to threshold effects (e.g. Kim and Lin (2011) find that the benefits of financial development on income distribution occur only when the country has reached a threshold level of financial development) or conditionality effects (e.g. Law et al. (2014) conclude that financial development tends to reduce income inequality only after a certain threshold level of institutional quality has been achieved) or find mixed results (e.g. Bahmani-Oskooee and Zhang (2015) report that only in three out of the 10 countries where finance has a short-term equalizing effect on income distribution the improvement lasts in the long run.) Finally, several more recent studies report that financial development increases income equality (e.g. Jauch and Watzka, 2012; Jaumotte et al., 2013, Li and Yu, 2014, Denk and Cournede, 2015 and Dabla-Norris et al., 2015).

These differences across the findings of studies only to some extent reflect differences in methodology: also studies using similar approaches frequently reach different conclusions. Take the studies of Hamori and Hashiguchi (2012) and Jauch and Watzka (2012). Although their samples (126 vs. 138 countries) and estimation periods (1963–2002 vs. 1960–2008) slightly differ, both studies use private sector credit to proxy financial development and use panel models. Still, their conclusions are very different. Hamori and Hashiguchi (2012) conclude that "this paper finds that financial deepening reduces inequality, even if we consider the impact of trade openness on inequality in the model" (p. 354), while Jauch and Watzka (2012, p. 3) "reject theories that predict an income inequality-reducing effect of financial development." This is quite remarkable also in view of the fact that both studies include GDP per capita as a control variable. Including this variable may affect the relationship between financial development and income inequality in view of the results found by several papers that financial development furthers economic development (Levine, 2005).

Whereas most studies include a large sample of countries, Denk and Cournede (2015) focus on industrial countries. They conclude that more finance is associated with higher income inequality in their sample of 33 OECD countries. This relationship holds when intermediated credit and stock market capitalization are used to measure the size of finance. These authors argue that financial sector employees are very strongly concentrated at the top of the income distribution, and their earnings exceed those of employees with similar profiles (such as age, gender or education) in other sectors (Denk, 2015).

Most studies discussed do not explore the transmission from finance to inequality. However, Gimet and Lagoarde-Segot (2011) examine specific channels linking banks, capital markets and income inequality. They construct a set of annual indicators of banking and capital market size, robustness, efficiency and international integration and then estimate the determinants of income distribution using a panel structural vector autoregressive model for 49 countries over the 1994–2002 period. These authors conclude that the impact of financial sector development on income inequality seems to run primarily via the banking sector; Naceur and Zhang (2016) reach the same conclusion.

Finally, some studies suggest that the impact of financial development on income inequality may be conditioned by the quality of institutions (cf. Delis et al., 2014 and Law et al., 2014). For instance, under low quality of economic institutions financial development (or financial liberalization) may not affect inequality due to lack of judicial protection for the poor (Chong and Gradstein, 2007). Likewise, Rajan and Zingales (2003) argue that under weak political institutions de jure political representation is dominated by de facto political influence allowing established interests to influence access to finance so that they benefit more from financial development than the poor.

2.2. Financial liberalization and income inequality

In recent decades there has been a global push to liberalize the financial sector. A small, but growing line of literature examines

[5] However, the question is whether financial development as such reduces these financial frictions. Perhaps these frictions can be reduced by other factors, such as technology, without a larger financial sector (Demirgüç-Kunt and Levine, 2009). This suggests that other financial sector characteristics than size should be examined. Most empirical research focuses, however, on financial sector size, a recent exception being the study by Naceur and Zhang (2016).

[6] Here we only discuss research using macro data for a large set of countries. For a discussion of other types of research we refer to Demirgüç-Kunt and Levine (2009).

the impact of financial liberalization on income inequality. For instance, Beck et al. (2010) assess the impact of U.S. bank deregulation of the 1970s to the 1990s on the distribution of income and find that deregulation significantly reduces inequality by boosting incomes in the lower part of the income distribution but has little impact on incomes above the median.

Several arguments have been put forward in the literature suggesting that financial sector liberalization may affect income distribution. First, imperfections in the credit market prevent the poor from making productive investment, in for instance, education (Banerjee and Newman, 1991). If financial liberalization reduces these credit market imperfections, income inequality may be reduced. Second, financial reforms may lead to more equal access to credit thereby improving the efficiency of the domestic financial system (Abiad et al., 2008).

A few studies examine the relationship between financial sector liberalization and income inequality using cross-country data (see Table A1 for details). Most of these studies (Agnello et al., 2012; Delis et al., 2014; Li and Yu, 2014) report that financial liberalization reduces income inequality, but Jaumotte and Osuorio Buitron (2015) and Naceur and Zhang (2016) conclude that financial liberalization increases inequality.[7]

Most studies on the impact of financial liberalization on income inequality use the index of Abiad et al. (2010) for measuring liberalization. This index is based on seven sub-indices mostly pertaining to banking regulatory practices measured on a scale from 0 to 3 (fully repressed to fully liberalized). The database covers 91 economies over the 1973–2005 period. Delis et al. (2014) examine the effect of different sub-indices of Abiad et al. (2010) and find that the inequality-reducing effect is not uniform across all liberalization policies, nor is it the same across countries with different levels of development or different types of financial environments. In particular, the abolishment of credit controls decreases income inequality substantially, and this effect is long lasting.

Some studies, however, analyze the impact of capital account liberalization, which is one of the dimensions of the index of Abiad et al. (2010), on income inequality. For instance, Das and Mohapatra (2003) analyze income distribution changes by comparing the size of three income shares before and after capital account liberalization for a sample of 11 countries that undertook extensive reforms between 1986 and 1995. They find that capital account liberalization benefits people in the top quintile of the income distribution at the expense of the 'middle class', while people in the lowest income shares are, on average, hardly affected. Also two recent studies examine the impact of capital account liberalization on income inequality. The empirical results of Bumann and Lensink (2016) suggest that capital account liberalization only tends to lower income inequality if the level of financial depth, as measured by private credit over GDP, exceeds 25 percent. These results stand in contrast to the findings of Furceri and Loungani (2015), who find that, on average, capital account liberalization increases inequality. In addition, their results suggest that capital account liberalization leads to larger increases in inequality in countries with a weak level of financial institutions and when they are followed by episodes of financial crises.[8]

Whereas most studies use panel data regressions, Christopoulos and McAdam (2016) examine the link between financial reforms and the stabilization of income inequality using panel unit root tests extended to allow for the presence of some covariates. Their results suggest that although both gross and net Gini indices follow a unit root process this picture changes when the various financial reforms indices are considered as additional covariates in the standard panel unit root approach. In particular whilst gross Gini coefficients are generally not stabilized by financial reforms, net measures are more likely to be stabilized.

2.3. Financial crises and income inequality

Finally, we consider the impact of financial crises on income inequality. While there is limited research on a causal relationship between financial crisis and inequality (see below), the causality in the other direction, i.e. from (increases in) income inequality to financial crises, has received substantial attention. High or rising income inequality may cause low-income groups to leverage in order to increase or maintain consumption levels which, in turn, may increase the likelihood of a financial crisis. The relative income theory, habit formations and a "keeping up with the Joneses" phenomenon may explain such behavior (see Atkinson and Morelli, 2011 for a further discussion). For instance, in the model of Kumhof and Rancière (2011) rising income inequality and stagnant incomes in the lower deciles lead workers to borrow to maintain consumption growth. This increases leverage, and eventually a shock to the economy leads to a financial crisis. Indeed, there is much evidence that financial crises are often preceded by credit booms (Schularick and Taylor, 2012). However, the empirical evidence in support of causality running from inequality to financial crises is weak at best. Cross-country data indicate that banking crises have not systematically been preceded by rising inequality (Atkinson and Morelli, 2011; Bordo and Meissner, 2012), although Gu and Huang (2014) report some supporting evidence.[9]

Wealth losses due to a financial crisis probably will hit the top of the income distribution. However, low-income individuals will

[7] This finding is consistent with the results reported by Phillippon and Reshef (2013) who examine long-run trends in finance in a few advanced economies. They find that financial deregulation increased the demand for skills in the financial sector and that relative wages in the financial sector are related to skill-intensity.

[8] Lorrain (2015) analyzes the effect of capital opening on the relative wage between skilled and unskilled workers. Using data for 20 mainly European economies from 1975 through 2005, he provides evidence that capital account liberalization increases the relative wage between workers with college education and those with high school education.

[9] Atkinson and Morelli (2011) examine the relationship between crises and income inequality using case studies of banking crises over a 100-year period (1911–2010) in 25 countries. They conclude that "banking crises were preceded by falling inequality as many times as by rising inequality" (p. 47). They also report that there "is more evidence that financial crises are followed by rising inequality" (p. 49). Using data from 14 advanced countries between 1920 and 2000, Bordo and Meissner (2012) report that credit booms heighten the probability of a banking crisis, but there is no evidence that a rise in top income shares leads to credit booms. Gu and Huang (2014) challenge these results on econometric grounds. Using a similar dataset, they "establish strong evidence for rising inequality as a significant determinant of credit booms and therefore financial crises in Anglo-Saxon countries and other similar economies" (p. 513). However, for other countries their evidence is not supportive for a positive causal link from inequality to crises.

be hit more if the financial crisis is followed by an economic downturn (which is not always the case). Indeed, according to the OECD (2013), during the global financial crisis the average market income inequality across OECD countries increased by 1.4 percentage points. Looking at the 17 OECD countries for which data are available over a long time period, market income inequality increased by more between 2007 and 2010 than what was observed in the previous 12 years. However, Denk and Cournede (2015) do not find a significant effect of banking crisis crises in their analysis of income inequality in 33 OECD countries during 1970–2011.

Only few other studies have examined the causal relationship between financial crises and income inequality for a broader set of countries. Baldacci et al. (2002) report that currency crises have a positive impact on the Gini coefficient (i.e. lead to more inequality), while Li and Yu (2014) find similar results for banking crises. Based on a case study analysis of several crises, also Atkinson and Morelli (2011) find that income inequality is likely to increase after a banking crisis.

In contrast, Agnello and Sousa (2012) find mixed results. While for OECD countries a banking crisis reduces inequality, for non-OECD the authors observe a significant rise in inequality before the onset of the crisis but no effect thereafter. In contrast, for a sample of developing countries, Honohan (2005) does not find evidence for a significant difference between Gini coefficients before and after a banking crisis. Likewise, Jaumotte and Osuorio Buitron (2015) do not report a significant impact of banking crises on income inequality.

3. Data and method

3.1. Income inequality

Following most previous studies as discussed in Section 2, our left-hand side variable is the Gini coefficient based on households' income from Solt's (2009) Standardized World Income Inequality Database (SWIID). We use the index that represents household income before taxes, as this in our view is the best proxy for income inequality before redistribution via the tax system. Although we acknowledge that government spending and taxes also affect income distribution measured by the gross Gini coefficient as argued by Bergh (2005)[10], it is still a much better proxy than the net Gini coefficient as that for sure is heavily influenced by redistribution via taxes and transfers.

As pointed out by Delis et al. (2014) and Solt (2015), the SWIID database is the most comprehensive database and allows comparison across countries, because it standardizes income.[11] The Gini coefficient is derived from the Lorenz curve and ranges between 0 (perfect equality) and 100 (perfect inequality). We acknowledge that the Gini coefficient is less than perfect and that other measures, such as the share of income of the lowest quintile, may sometimes be more appropriate. Data availability, however, dictates our choice. We construct averages of the Gini coefficients across 5 years where the Gini coefficients are centered at the middle of the five-year period.

We use five-year non-overlapping averages for three reasons (see also Dabla-Norris et al., 2015). First, annual macroeconomic data are noisy, and this applies especially for data on income inequality (Delis et al., 2014). Second, the annual income inequality data in SWIID are imputed for years for which no information was available in the underlying databases (there are only infrequent measures of inequality for much of Africa, Latin America, and Asia). Third, some of the explanatory variables used are only available for five-year intervals. Fourth, we are not so much interested in short-term, i.e. business cycle, driven effects.

We have considered using the World Income Inequality Database (WIID) instead of SWIID as source for data on income inequality. SWIID is based on WIID, but is supplemented by other sources and has all of its observations multiply-imputed (Jenkins, 2015).[12] WIID often provides more than one Gini coefficient for the same country/year. To deal with this problem, we proceed as follows. We first take averages of country/year pairs that have the same quality label (high, average, low, and not known). This reduces the number of potential duplicates to at most 4 (high, average, low, not known) per country/year pair. Next, we take the average Gini coefficient that belongs to the highest quality group so that we have one observation per country/year, which can be an average of several observations of the highest quality available. As we are not interested in short-run dynamics, our analysis is based on 5-year averages. As SWIID provides observations for each year, these averages can be easily computed. In WIID there are many missing observations. We considered two alternative approaches to construct proxies for the Gini coefficient measured over 5-year intervals. First, we take the Gini coefficients in the middle of this 5-year period, if available (Gini (WIID)). The downside of this approach is that we are not averaging out of a couple of adjacent years. As an alternative, we take a 5-years average (Gini 5 years avg. (WIID)). This reduces the sample considerably as any single missing value within a five-year period does not allow the calculation of the average.

Table 1 presents some summary statistics for the gross and net Gini coefficients drawn from SWIID and the Gini coefficients constructed on the basis of WIID. As the table shows, the number of observations available for the income inequality measures based on WIID is much lower than for those based on SWID. When using data from WIID we cannot distinguish between market and net Gini coefficients. As pointed out by Solt (2015, p. 685) this is problematic: "mixing gross- and disposable-income observations ...

[10] Bergh (2005) identifies several reasons why the welfare state may influence the pre-fiscal income distribution. For instance, the tax and transfer system in place may affect labour supply decisions and thereby gross market income. High marginal tax rates may incentivize workers to prefer more leisure time (i.e. the substation effect of high taxes dominates the income effect). There is extensive research on this issue. Discussing this literature, Manski (2012) recently concluded that "the profession does not know the direction of the effect of tax rates on labour supply, never mind the magnitude." Although not everyone would probably agree with this conclusion, it shows that it is not straightforward to take these effects into account.

[11] Still, it is not without problems; see Galbraith (2012; chapter 2) for an extensive discussion.

[12] We thank Stephen Jenkins for providing this database.

Table 1
Summary statistics of different Gini coefficients–SWIID vs. WIID.

	Variable	Obs	Mean	St. Dev.	Min	Max	Correlation with			
							1	2	3	4
1	Gross Gini (SWIID)	530	45.37	7.26	22.66	69.85	1			
2	Net Gini (SWIID)	530	38.20	9.45	19.43	66.20	0.70	1		
3	Gini (WIID)	335	39.26	9.72	20.10	74.30	0.63	0.89	1	
4	Gini 5 years avg. (WIID)	184	36.98	8.92	21.32	58.40	0.52	0.90	0.97	1

suggests a simple failure to consider what is the theoretically relevant variable…" However, such a distinction would reduce the sample even further. It appears that about a quarter of the observations in WIID follow some kind of gross income concept.

The correlations reported in Table 1 support this and suggest that most of the WIID data are indeed based on a net income concept: the correlation of the WIID variables with our (preferred) gross Gini coefficient from SWIID is relatively low (0.6 or 0.5), whereas it is much higher with the net Gini coefficients from SWIID (around 0.9).

As we are interested in the impact of finance on income inequality before income redistribution and do want to be able to work with a respectable and representative sample, we decided against using the WIID data.

3.2. Explanatory variables

We follow most of the literature and measure financial development by private credit divided by GDP. As explained in Section 2.1, it has the advantage of measuring the key function of financial intermediaries, i.e. the channeling of society's savings to private sector projects. In addition, the evidence of Gimet and Lagoarde-Segot (2011) and Naceur and Zhang (2016) suggests that the impact of finance on income inequality runs via the banking sector rather than capital market capitalization.[13]

Fig. 1 shows two scatter plots of our measures for income inequality and financial development. The graph on the left-hand side shows the relationship using the raw data. This graph does not suggest that there is a relationship between the two variables. The graph on the right-hand side shows the relationship controlling for country-fixed effects. This graph suggests that more financial development increases income inequality.

We use two measures for financial sector liberalization. First, following previous studies we employ the data of Abiad et al. (2010) that is based on several sub-indices mostly pertaining to banking regulatory practices measured on a scale from 0 to 3 (fully repressed to fully liberalized). The database consists of seven indices of financial sector liberalization. Our first measure of financial liberalization is the sum of six these. As the sub-index on banking supervision is not about financial sector liberalization we exclude it. Our sample for which we use this proxy for financial liberalization consists of 89 countries (listed in Table A2 of the Appendix) and runs from 1975 to 2005.

As an alternative, we employ data from the Fraser Institute on economic freedom that has a broader coverage of the financial sector (as pointed out by Delis et al. (2014), the index of Abiad et al. (2010) primarily reflects policies related to the banking sector)[14] and is available for more countries and more recent years. The economic freedom index covers up to 157 countries with data relevant for this paper being available for approximately 70 countries as far back as 1975.[15] We use the sum of four sub-indices from the economic freedom database, namely the sub-indices 3D, 4 C, 4D and 5 A. These indices range between 0 (not free) to 10 (totally free). The first index refers to freedom to own foreign currency bank accounts and measures the ease with which other currencies can be used via domestic and foreign bank accounts. The second index is based on the percentage difference between the official and the parallel (black) market exchange rate. Countries with a domestic currency that is fully convertible without restrictions receive a score of ten. When exchange rate controls are present and a black market exists, the ratings will decline toward zero as the black-market premium increases toward more than 50%. In the latter case, a zero rating is given. The third index measures controls of the movement of capital. The fourth index measures the extent to which the banking industry is privately owned, the extent to which credit is supplied to the government sector and whether controls on interest rates interfere with the market in credit. Our sample for which we use this proxy for financial liberalization consists of 121 countries (listed in Table A2 of the Appendix) and runs from 1975 to 2005.

Figs. 2 and 3 show the relationship between our measures for income inequality and financial liberalization, again with and without controlling for fixed effects. The graphs without fixed effects do not suggest that there is a relationship between income inequality and financial liberalization, while those with fixed effects suggest that financial liberalization leads to more inequality.

Our crisis data come from Laeven and Valencia (2013) who provide information on the timing of systemic banking crises. Chaudron and de Haan (2014) show that this database is more reliable than competing financial crises databases. Crises are identified based on several criteria. First, there should be signs of financial distress in the banking system. Banking crises are also

[13] Using the data as described in Čihák et al. (2012), we also investigate whether the results are sensitive to using stock market capitalization as percentage of GDP as measure of financial development. Although this reduces the sample substantially, the qualitative results tend to go in the same direction.

[14] The sub-indices of the index of Abiad et al. (2010) refer to credit controls and reserve requirements, interest rate controls, banking-sector entry, capital-account transactions, privatizations of banks, liberalization of securities markets, and banking-sector supervision and capital regulation.

[15] The data go back to 1970 but cover only 53 countries. Several studies have examined the relationship between the overall economic freedom index and income inequality, see, e.g. Bergh and Nilsson (2010) and Sturm and de Haan (2015).

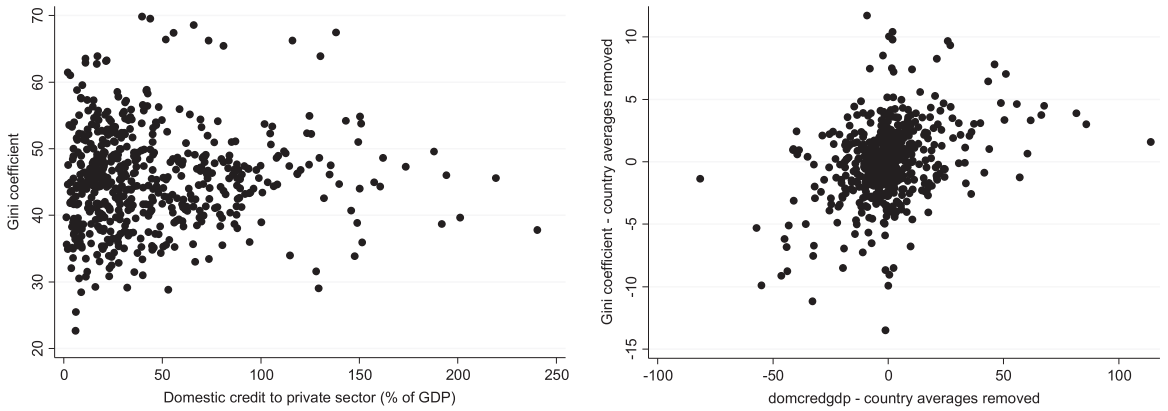

Fig. 1. Financial development (credit/GDP) and income inequality (Gini coefficients).

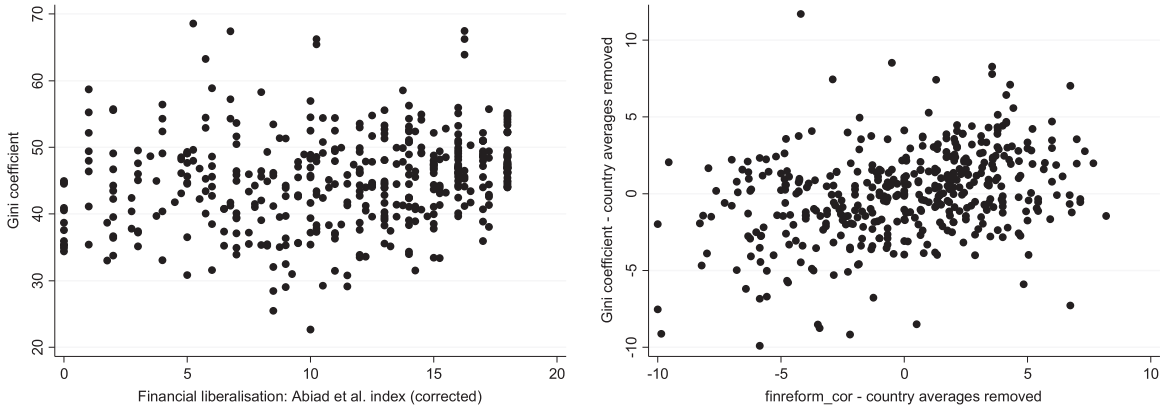

Fig. 2. Financial liberalization (Abiad et al. measure) and income inequality (Gini coefficients).

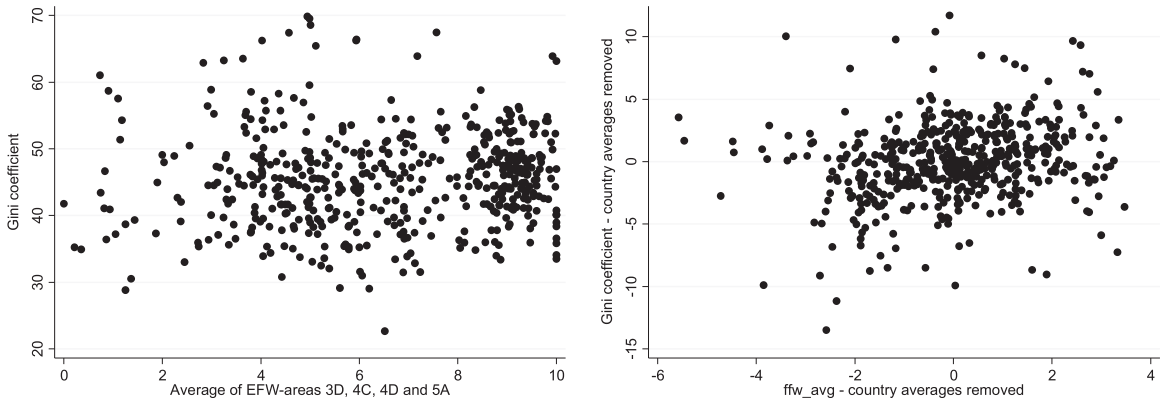

Fig. 3. Financial liberalization (economic freedom measure) and income inequality (Gini coefficients).

identified by "significant banking policy intervention measures" of which they identify six (such as a deposit freeze or nationalizations). At least three of these measures need to have been implemented for a crisis to be classified as systemic. This condition is supplemented with three other criteria, namely that the share of nonperforming loans exceed 20 percent, bank closures make up at least 20 percent of banking assets and fiscal restructuring costs exceed 5 percent of GDP. Our crisis variable is one when a banking crisis started in the five-year period before and is zero otherwise.

3.3. Method

As we are interested in the within country relationship between finance and income inequality, we use a dynamic panel model instead of OLS cross-section regressions in our main analysis. As pointed out by Beck et al. (2007), a dynamic panel model has

several advantages compared to cross-country regressions as the latter do not fully control for unobserved country-specific effects and do not exploit the time-series dimension of the data. The model estimated is:

$$Ineq_{i,t} = \alpha_i + \alpha_1 FD_{i,t-1} + \alpha_2 FL_{i,t-1} + \alpha_3 BC_{i,t-1} + \alpha_4 interactions + \alpha_5 X_{i,t} + u_{i,t}$$

Where *Ineq* is income inequality, *FD* is financial development, *FL* is financial liberalization, *BC* denotes the occurrence of a banking crisis and *X* is a vector of control variables, while *u* denotes the error term. Time lags are used to avoid endogeneity issues (but this may not be sufficient and therefore we consider alternative approaches below). For *FD* and *FL* we take values at the end of the five-year period preceding the period covered by the Gini coefficient (which is a five-year average), while the banking crisis dummy is one when a banking crisis started in any of the five years preceding the five-year period used for calculating the Gini coefficient. We have used a very long list of control variables based on previous studies (shown in Table A3 in the Appendix; Tables A4 and A5 provides summary statistics and a correlation matrix).[16]

As pointed out in the Introduction, we focus on two interactions that, according to insights from the literature, may condition the impact of finance on income inequality. First, we examine whether the impact of financial liberalization on income inequality depends on the level of financial sector development. Second, we examine whether the impact of financial liberalization and/or financial development on income inequality is conditioned by institutional quality.

We have constructed two institutional quality variables using the ICRG database measuring the quality of political institutions and the quality of economic institutions, respectively. On a scale from zero (low quality) to six (high quality), the variable democratic accountability measures not just whether there are free and fair elections, but also how responsive government is to its people. This variable comes directly from the ICRG database. It measures precisely what e.g. Acemoglu and Robinson (2013, p. 36) have in mind when they explain why the quality of political institutions matters in explaining the different economic fates of Mexico and the US and the role of access to finance therein: "Unlike in Mexico, in the United States the citizens could keep politicians in check and get rid of ones who would use their offices to enrich themselves or create monopolies for their cronies.... The broad distribution of political rights in the United States, especially when compared to Mexico, guaranteed equal access to finance and loans." Our indicator of the quality of economic institutions is the sum of three ICRG variables, namely bureaucratic quality, corruption and law and order (taking differences in scaling of these indicators into account) where a higher number indicates better quality.

4. Main results

Tables 2 and 3 present the results where we proceed as follows. First, we show the results when we do not include control variables. As our three finance measures may be related (e.g. more financial development may lead to more banking crises and a low level of financial development may be an incentive for countries to introduce financial liberalization), we first show simple bivariate regressions before including all our finance measures. In the next step we add the interactions outlined above. To interpret the interaction effects, we use graphs as suggested by Brambor et al. (2006).[17] Finally, we add control variables in Table 2 that turn out to be significant (in Table 3 we include the same controls).[18] In Table 2 the measure for financial liberalization based on Abiad et al. (2008) is used, while in Table 3 financial liberalization is proxied by the index based on several components of the Fraser Institute's economic freedom index, which captures more dimensions of the financial system than the index of Abiad et al. (2010).

In the first three columns of Tables 2 and 3 the financial sector variables are included separately, while column (4) shows the results when all finance measures are included. In the regressions in these columns we do not include interaction terms and control variables. The results suggest that financial development, financial liberalization and banking crises increase income inequality, also when they are included simultaneously.

Next we turn to the interaction of financial liberalization and financial development to examine whether financial development conditions the impact of financial liberalization on income inequality, as suggested by Bumann and Lensink (2016). The line in Fig. 4 shows the marginal impact of financial liberalization on income inequality for different levels of financial development. The whiskers show the 90% confidence band and the grey bars show the distribution of the observations. The graphs are based on the estimates reported in column (5) of both tables. The graphs in Fig. 4 suggest that the impact of financial liberalization is conditioned by the level of financial development: the positive impact of financial liberalization on the Gini coefficient is higher when financial development is higher. This conclusion holds for both measures of financial liberalization.[19] As shown in Table A7, adding time fixed effects does not change our conclusion. So these results do not support the prediction of Bumann and Lensink (2015) that financial

[16] Due to data availability some variables that have been suggested to be related to income inequality, such as technology (see e.g. Dabla-Norris et al., 2015), could not be included.

[17] Most studies discussed in Section 2 that consider interactions draw conclusions on the basis of the significance of the interaction term, which generally is not the proper way to deal with interactions as shown by Brambor et al. (2006).

[18] GDP growth has been included, as has GDP per capita. As shown in Table A6 in the appendix, except for financial development (domestic credit), our results do not change by including these variables. GDP growth is not significant, while GDP per capita is only significant in column (5) in Table A6. It is commonly known, that GDP per capita and GDP growth are highly correlated with financial development (Levine, 2005). So it is not a surprise that adding GDP (growth) affects our results for financial development.

[19] We have also examined the interaction of financial development and the Chin-Ito index for financial openness. Kunieda et al. (2014) argue that the relationship between financial development and income inequality is conditioned by financial openness. Their evidence, based on a sample of more than 100 countries for the period 1985–2009, suggests that in financially open countries (where financial openness is computed from the data set of Lane and Milesi-Ferretti, 2007), financial development (measured as private credit to GDP) increases income inequality, while in financially closed economies financial development decreases income inequality. Our results (available on request) do not provide evidence for this view.

Table 2
Finance and income inequality: panel estimates (dependent variable: Gini coefficient; Abiad et al. data for financial liberalization).

VARIABLES	(1)	(2)	(3)	(4)	(5) +interaction	(6) +democ	(7) +democ	(8) +democ	(9) +ec.glob-flows
Start of a Systemic Banking Crisis during t-7 and t-3	0.876**			1.049**	0.976**	1.026***	0.940***	0.903***	0.895**
	(2.022)			(2.439)	(2.387)	(2.800)	(2.661)	(2.725)	(2.515)
Domestic credit to private sector (% of GDP)		0.0652***		0.0518***	−0.0168	0.0349***	0.0297***	0.0464	0.0247***
		(5.089)		(4.278)	(−0.507)	(3.405)	(3.002)	(1.065)	(2.695)
Financial lib.: Abiad et al. index (corrected)			0.256***	0.155***	0.0186	0.202***	−0.146	−0.178	−0.198
			(4.153)	(3.120)	(0.245)	(3.771)	(−1.197)	(−1.230)	(−1.643)
c.domcredgdp#c.finreform_cor					0.00404**				
					(2.325)				
ICRG: Democratic Accountability						−0.638**	−1.641***	−1.557***	−1.605***
						(−2.430)	(−3.452)	(−3.677)	(−3.619)
c.democ#c.finreform_cor							0.0895***	0.0957***	0.0857***
							(2.920)	(2.653)	(2.863)
c.domcredgdp#c.democ								−0.00325	
								(−0.429)	
Economic Globalization: Actual Flows									0.0628***
									(2.644)
Observations	426	426	426	426	426	345	345	345	338
R-squared	0.011	0.173	0.111	0.217	0.242	0.194	0.219	0.221	0.261
Number of cntid	89	89	89	89	89	86	86	86	85
Hausman test (p-value)	0.886	0.0955	0.484	0.397	0.0779	0.0480	0.000151	0.000287	7.27e-05
F-test on finreform_cor (p-value)					0.00115		0.000105	6.11e-05	0.00153
F-test on democ (p-value)							0.00378	0.00457	0.00218
F-test on domcredgdp (p-value)					5.11e-06			0.0116	

Notes: Country-fixed effects are included. Robust t-statistics in parentheses. Standard errors clustered at the country level. * $p < 0.1$.
*** $p < 0.01$,
** $p < 0.05$,

liberalization will decrease income inequality at high levels of financial development.

In the next step we consider institutional quality. We first add our proxies for the quality of political and economic institutions to the model shown in column (4). Including these variables may shed some light on the relevance of a potential criticism of our results, namely that inequality and financial development are both driven by institutional factors. For instance, according to Claessens and Perotti (2007, p. 749), "economic inequality and (financial) underdevelopment are jointly determined by institutional factors which cause unequal access to political and contractual rights." If true, adding proxies for institutional quality should affect our results. It turns out that democratic accountability is significant in contrast to our proxy for the quality of economic institutions which is therefore not shown in column (6) of Tables 2 and 3. Our results suggest that better political institutions reduce income inequality. Importantly, adding the quality of institutions does not change our previous finding that finance increases income inequality.

Fig. 5 shows the marginal effects of financial liberalization on income inequality for different levels of democratic accountability. The graphs are based on the regressions shown in column (7) of Tables 2 and 3. They suggest that the positive impact of financial liberalization on the Gini coefficient is higher in countries with a higher quality of political institutions. In fact, at low levels of democratic accountability financial liberalization does not significantly affect income inequality. In these regressions we do not include the interaction between financial liberalization and financial development as financial development has been shown to be dependent on institutional quality (see e.g. Law and Azman-Saini, 2012).

Fig. 6 presents the marginal effects of financial development on income inequality for different levels of democratic accountability. The graphs are based on the regressions shown in column (8) of Tables 2 and 3. They do not provide strong evidence that the impact of financial development on income inequality is conditioned by the quality of political institutions, in contrast to the prediction of Rajan and Zingales (2003) that under high-quality institutions financial development will reduce inequality.

The interactions of our finance variables and our proxy for the quality of economic institutions do not suggest that the impact of finance on income inequality is conditioned by the quality of economic institutions. For instance, Fig. A1 in the Appendix shows the marginal effects of financial liberalization on the Gini coefficient for different levels of the quality of economic institutions. The marginal effects of financial liberalization on inequality for different levels of institutional quality are not significantly different for different values of institutional quality.

Table 3
Finance and income inequality: panel estimates (dependent variable: Gini coefficient; economic freedom data for financial liberalization).

VARIABLES	(1)	(2)	(3)	(4)	(5) +interaction	(6) +democ	(7) +democ	(8) +democ	(9) +ec.glob-flows
Start of a Systemic Banking Crisis during t-7 and t-3	1.225***			1.453***	1.394***	1.047***	0.951**	0.910**	0.923**
	(2.776)			(3.210)	(3.261)	(2.718)	(2.548)	(2.579)	(2.504)
Domestic credit to private sector (% of GDP)		0.0603***		0.0538***	−0.0305	0.0367***	0.0305***	0.0572	0.0217**
		(4.654)		(4.462)	(−0.736)	(3.886)	(3.457)	(1.330)	(2.557)
Financial lib.: Avg. of EFW-areas 3D, 4C, 4D and 5A			0.426**	0.244	−0.0502	0.190	−0.639*	−0.736**	−0.589*
			(2.451)	(1.650)	(−0.215)	(1.497)	(−1.908)	(−2.259)	(−1.906)
c.domcredgdp#c.ffw_avg					0.00942**				
					(2.113)				
ICRG: Democratic Accountability						−0.727***	−2.146***	−2.061***	−1.941***
						(−2.785)	(−3.487)	(−3.261)	(−3.396)
c.democ#c.ffw_avg							0.224***	0.245***	0.182**
							(2.928)	(3.128)	(2.542)
c.domcredgdp#c.democ								−0.00506	
								(−0.690)	
Economic Globalization: Actual Flows									0.0840***
									(3.572)
Observations	518	518	518	518	518	410	410	410	403
R-squared	0.017	0.126	0.044	0.157	0.177	0.123	0.162	0.166	0.215
Number of cntid	121	121	121	121	121	110	110	110	109
Hausman test (p-value)	0.818	0.00972	0.388	0.0704	0.0319	0.173	0.0781	0.0659	0.0568
F-test on ffw_avg (p-value)					0.00561		0.00135	0.00139	0.0217
F-test on democ (p-value)							0.00259	0.00739	0.00203
F-test on domcredgdp (p-value)					8.43e-06			0.00216	

Notes: Country-fixed effects are included. Robust t-statistics in parentheses. Standard errors clustered at the country level.
*** $p < 0.01$,
** $p < 0.05$,
* $p < 0.1$.

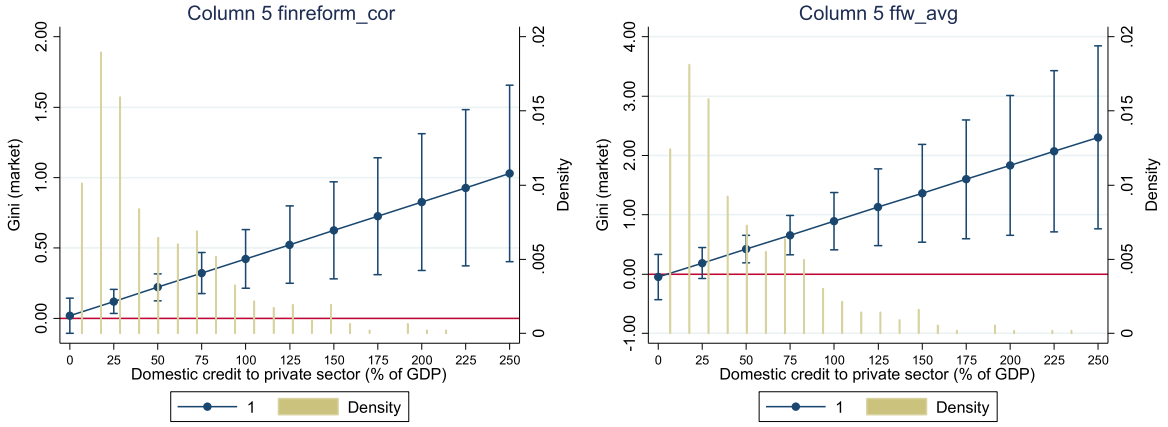

Fig. 4. Marginal impact of financial liberalization on income inequality for different levels of financial development.

The next column in both tables shows the results when we add economic globalization to the model shown in column (7) of Tables 2 and 3.[20] As said, we consider a long list of potential controls, but most of them are not significant. In line with findings of Sturm and de Haan (2015), globalization turns out to be significant in Tables 2 and 3 (column 9). Adding controls does not change our conclusions as shown by the marginal plot graphs (available on request).

[20] The globalisation measures we use are all taken from the KOF Globalization Index (http://globalization.kof.ethz.ch/). See Dreher (2006) for details.

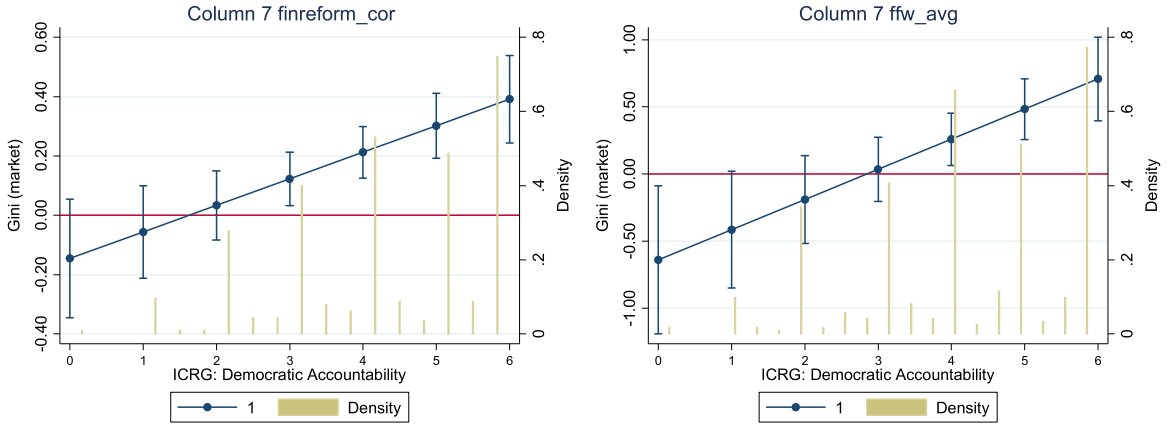

Fig. 5. Marginal impact of financial liberalization on income inequality for different levels of democratic accountability.

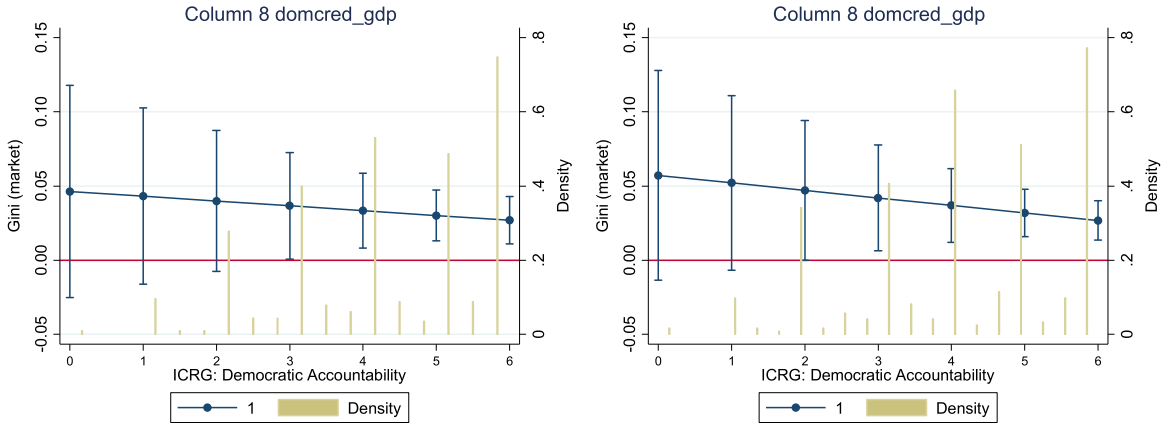

Fig. 6. Marginal impact of financial development on income inequality for different levels of democratic accountability.

5. Sensitivity analysis

In this section we present the outcomes of several sensitivity tests that have two purposes. First, as our results deviate from those of several previous studies, we examine to what extent our findings change when different empirical set-ups are used. Second, we further analyze whether our results are robust for endogeneity, which is a key issue in this type of analysis.

5.1. Random effects models

So far, our results are based on panel fixed effects models. In this section we present the outcomes of random effects models following Clarke et al. (2006) who use random effects arguing that using fixed effects takes away much (cross-country) variation. Since the Hausman tests often do not clearly indicate that fixed effects need to be used, it makes sense to also estimate random effects models. This has an additional advantage, namely that we can follow several previous papers (Clarke et al., 2006; Kappel, 2010; Kunieda et al. 2014 and Law et al., 2014) and use legal origin dummies as instruments for financial development. According to La Porta et al. (1997, 1998), the introduction of common or civil law into a country via conquest or colonization not only affected the legal rules but also institutions. For instance, the protection of property rights in common law countries, which impacts the development of financial markets, is stronger than that in civil law countries, notably in countries with French civil law. Therefore, legal origin dummies are frequently used as instrumental variables (cf. Acemoglu and Johnson, 2005).

Table 4
Random effects GLS and G2SLS estimates.

VARIABLES	Abiad et al. index (corrected)				Avg.of EFW-areas 3D, 4C, 4D and 5A			
	(1) FD	(2) +IV	(3) PI	(4) +IV	(5) FD	(6) +IV	(7) PI	(8) +IV
Start of a Systemic Banking Crisis during t-7 and t-3	1.012**	0.954***	1.017***	1.023***	1.436***	1.221***	1.010***	1.000***
	(2.513)	(2.687)	(2.862)	(3.559)	(3.441)	(2.979)	(2.720)	(3.098)
Domestic credit to private sector (% of GDP)	−0.0188	−0.0872*	0.0283***	0.0124	−0.0358	−0.138**	0.0277***	0.00508
	(−0.578)	(−1.790)	(3.426)	(0.560)	(−0.900)	(−2.362)	(3.613)	(0.191)
Financial liberalisation	0.0338	−0.00983	−0.109	−0.179	−0.0401	−0.0317	−0.618*	−0.712**
	(0.455)	(−0.137)	(−0.924)	(−1.565)	(−0.180)	(−0.128)	(−1.860)	(−2.374)
c.domcredgdp#c.finlib	0.00391**	0.00708***			0.00919**	0.0167***		
	(2.202)	(3.688)			(2.087)	(2.696)		
ICRG: Democratic Accountability			−1.456***	−1.706***			−2.020***	−2.236***
			(−3.092)	(−3.569)			(−3.257)	(−4.265)
c.democ#c.finlib			0.0817***	0.105***			0.217***	0.258***
			(2.722)	(3.640)			(2.831)	(3.987)
Observations	426	426	345	345	518	518	410	410
Number of cntid	89	89	86	86	121	121	110	110
F-test on domcredgdp (p-value)	8.57e-08				3.80e-06			
F-test on finlib (p-value)	0.000673	0.000638	4.49e-05	1.77e-05	0.00761	0.00141	0.00187	0.000113
F-test on democ (p-value)			0.00836	0.000754			0.00436	9.09e-05

Notes: Country-random effects are included. Standard errors are clustered at the country level in columns (1), (3), (5) and (7). In the "+IV" columns dom. credit is instrumented using legal origin dummies and bootstrapped standard errors are shown.
*** p < 0.01,
** p < 0.05,
* p < 0.1.

Table 5
Cross-country regressions.

VARIABLES							Instrumental variables		
	(1) 1991–1995	(2) 1991–2000	(3) 1991–2005	(4) 1996–2000	(5) 1996–2005	(6) 1996–2010	(7) 1996–2000	(8) 1996–2005	(9) 1996–2010
Start of a Systemic Banking Crisis during t-7 and t-3	−0.782	−0.720	−0.515	4.104**	3.686**	3.454**	3.224*	2.992	2.804
	(−0.417)	(−0.379)	(−0.279)	(2.444)	(2.322)	(2.152)	(1.702)	(1.412)	(1.583)
Domestic credit to private sector (% of GDP)	−0.0455*	−0.0438*	−0.0309	−0.00606	0.00561	0.00755	−0.0690	−0.0452	−0.0325
	(−1.779)	(−1.688)	(−1.227)	(−0.269)	(0.265)	(0.372)	(−1.277)	(−0.910)	(−0.813)
Financial lib.: Abiad et al. index (corrected)	0.762	1.029**	1.097**	1.372**	1.188**	1.007	1.312**	1.223**	1.143
	(1.569)	(2.088)	(2.293)	(2.183)	(2.009)	(1.664)	(2.196)	(2.059)	(1.600)
ICRG: Democratic Accountability	1.620	2.195	2.458*	0.381	0.218	0.0577	−0.430	−0.305	−0.0928
	(1.160)	(1.550)	(1.783)	(0.179)	(0.109)	(0.0279)	(−0.186)	(−0.138)	(−0.0338)
c.democ#c.finreform_cor	−0.118	−0.180	−0.207*	−0.126	−0.110	−0.0817	−0.0327	−0.0482	−0.0526
	(−1.050)	(−1.577)	(−1.871)	(−0.819)	(−0.756)	(−0.558)	(−0.182)	(−0.273)	(−0.263)
Observations	66	66	65	78	77	66	78	77	66
R-squared	0.084	0.101	0.099	0.198	0.183	0.187	0.235	0.222	0.221
F-test on finreform_cor (p-value)	0.191	0.0876	0.0691	0.00222	0.00540	0.0125	5.57e-05	1.59e-06	0.000126
F-test on democ (p-value)	0.514	0.281	0.177	0.184	0.182	0.289	0.593	0.496	0.584

Notes: In columns (7) to (9) domcred_gdp is instrumented using legal origin dummies. *** p < 0.01
** p < 0.05,
* p < 0.1.

Table 4 shows the outcomes. Columns (1)-(4) present the results when we use the measure for financial liberalization based on the data of Abiad et al., while columns (5)-(8) contain the results for the financial liberalization measure based on components of the economic freedom index.

Table 6
Regressions including only OECD countries.

VARIABLES	Abiad et al. index (corrected)			Avg.of EFW-areas 3D, 4 C, 4D and 5 A		
	(1) no interaction	(2) interaction	(3) +democ	(4) no interaction	(5) interaction	(6) +democ
Start of a Systemic Banking Crisis during t-7 and t-3	2.872***	2.763***	2.140***	2.784***	2.703***	1.915***
	(5.154)	(5.225)	(3.907)	(3.941)	(3.916)	(2.848)
Domestic credit to private sector (% of GDP)	0.0636***	0.0395	0.0412**	0.0571***	0.0369	0.0385***
	(4.347)	(0.783)	(2.537)	(3.989)	(0.435)	(3.294)
Financial liberalisation	0.302**	0.229	−0.0980	0.768**	0.645	−0.743
	(2.732)	(1.246)	(−0.112)	(2.596)	(1.129)	(−0.422)
c.domcredgdp#c.finlib		0.00142			0.00227	
		(0.513)			(0.242)	
ICRG: Democratic Accountability			−1.750			−2.133
			(−0.731)			(−0.961)
c.democ#c.finlib			0.0913			0.239
			(0.546)			(0.766)
Observations	136	136	99	144	144	106
R-squared	0.567	0.569	0.376	0.498	0.499	0.290
Number of cntid	22	22	22	24	24	24
Hausman test (p-value)	4.79e-06	1.79e-05	0.000898	0	0	0.000209
F-test on domcredgdp (p-value)		0.00122			0.00250	
F-test on finlib (p-value)		0.0381	0.181		0.0555	0.174
F-test on democ (p-value)			0.673			0.591

Notes: Country-fixed effects are included. Standard errors clustered at the country level. * p < 0.1.
*** p < 0.01,
** p < 0.05,

Columns (1) and (5) show the results when we estimate the model shown in column (5) of Tables 2 and 3 which includes our finance variables and the interaction between financial liberalization and financial development allowing for random effects. It turns out that the results are very similar. Next, in columns (3) and (7) we include democratic accountability in the model containing our three finance measures together with its interaction with financial liberalization (cf. column (7) in Tables 2 and 3). Like before, the results suggest that finance increases inequality, while institutional quality decreases inequality. In countries where democratic accountability is high, the effect of financial liberalization turns significantly positive. Hence, moving to a random effects framework does not lead to different results.

Finally, columns (2), (4), (6) and (8) show the IV results. In columns (2) and (4) our measures for financial development and financial liberalization are taken up and allowed to interact. (This corresponds to the specification in column (5) of Tables 2 and 3). In columns (4) and (8) the interaction between the quality of political institutions and financial liberalization is included. (This corresponds to the specification in column (7) of Tables 2 and 3). The outcomes suggest that instrumenting financial development by legal origin does not lead to different outcomes (see also Fig. A2 in the Appendix).

5.2. Cross-country regressions

Next, we present cross-country regressions results in Table 5. Even though we feel that panel models are most appropriate for our purpose, we want to check whether our results are different when we focus on cross-country differences in income inequality rather than within-country income inequality. We only show the outcomes for the financial liberalization measure based on the data of Abiad et al., as this is the variable used in previous studies. We use the specification with the three finance variables, democratic accountability and the interaction between financial liberalization and democratic accountability for different cross-sections (1991-95, 1991–2000, 1991–2005, 1996–2000, 1996–2005, and 1996–2010). This corresponds to column (7) in Tables 2 and 3. The final three columns show the outcomes in case we again instrument financial development by legal origin using the latter time periods. The results for banking crises and financial liberalization are broadly in line with our findings based on panel estimates, but we now find some evidence that financial development reduces income inequality (although the estimated coefficient is not significant in most regressions). This suggests that our focus on within-country income inequality explains to some extent the difference between the results of our study for the impact of financial development on income inequality and those of previous studies focusing on cross-country income inequality. Another difference between the panel and the cross-country regressions is that the coefficient of the quality of political institutions is never significant in the latter.

5.3. OECD countries

In this section we report the results when we estimate some models for OECD countries only. Table 6 shows fixed effects panel regressions for the specifications shown in columns (4), (5) and (7) of Tables 2 and 3. Our prior is that the interactions will not be significant, as the countries in this subsample are much more homogeneous when it comes to financial development and institutional quality than is the case in our full sample. This indeed turns out to be the case. Still, our main result that finance increases income inequality is also confirmed for OECD countries, also when we use our alternative measure for financial liberalization (last three columns of Table 6).

6. Conclusion

Our results suggest that financial development, financial liberalization and banking crises increase income inequality. In addition, the impact of financial liberalization on inequality seems to be conditioned by the level of financial development and the quality of political institutions. Our findings are in contrast to several previous studies that examined the relationship between financial development and income inequality.

As explained in Section 2, theory is not clear whether financial development will increase or decrease income inequality. Our results suggest that financial development increases inequality, which is in line with the model of Greenwood and Jovanovic (1990). It is important, however, to stress that our results do not imply that financial development and financial liberalization are necessarily bad for the poor. There is a large literature showing that finance plays a positive role in promoting economic development (at least up to a point),[21] which will benefit the poor. An interesting avenue for future research is to model the effects of financial development and financial liberalization on income inequality and economic growth simultaneously.

Our finding that financial development on income inequality is not conditioned by democratic accountability is in contrast to the prediction of Rajan and Zingales (2003) that under high-quality institutions financial development will reduce inequality. However, we find evidence that the impact of financial liberalization is conditioned by the quality of political institutions. Our findings do also not support the theoretical prediction of Bumann and Lensink (2016) that financial liberalization will improve income distribution in countries where financial depth is high. To the contrary, our results suggest that financial development enhances the income inequality increasing effect of financial liberalization. To explain this finding is beyond the scope of the current paper and is left for future research.[22]

Finally, we like to stress that our results are based on Gini coefficients for gross income, thereby largely ignoring (on purpose) government redistribution policies. An interesting issue for future research is to examine whether countries that have higher income inequality due to finance, have decided to redress this inequality by more income redistribution. Likewise, it would be interesting to examine whether our results hold for other measures for income inequality. This requires, however, that such data become available for a larger set of countries than is currently the case.

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Appendix A

Figs. A1 and A2 and Tables A1–A7.

[21] Some recent studies suggest that this relationship may be non-linear. For instance, Arcand et al. (2012) report that at intermediate levels of financial depth, there is a positive relationship between the size of the financial system and economic growth, but at high levels of financial depth, more finance is associated with less growth. In fact, the marginal effect of financial depth on output growth becomes negative when credit to the private sector reaches 80–100 per cent of GDP. Likewise, Cecchetti and Kharroubi (2012) report that financial development has a non-linear impact on aggregate productivity growth. Based on a sample of developed and emerging economies, they show that the level of financial development is good only up to a point, after which it becomes a drag on growth.

[22] But their model can be easily be adjusted and made in line with our results by allowing high-income agents to have a higher saving rate. That would make them benefit more from the increased loan demand – that is more pronounced in financially developed countries – that is caused by financial liberalization than those with lower income levels.

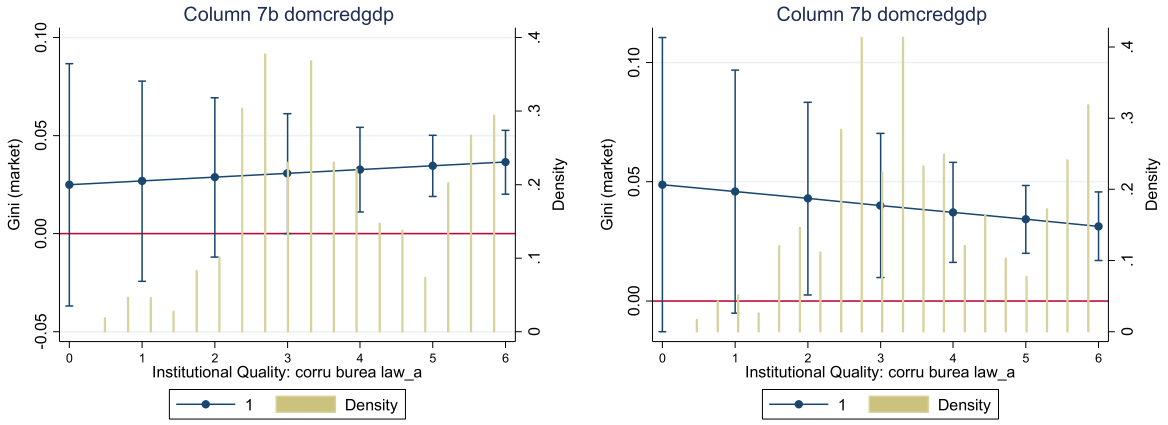

Fig. A1. Marginal effects of financial development on the Gini coefficient for different values of the quality of economic institutions.

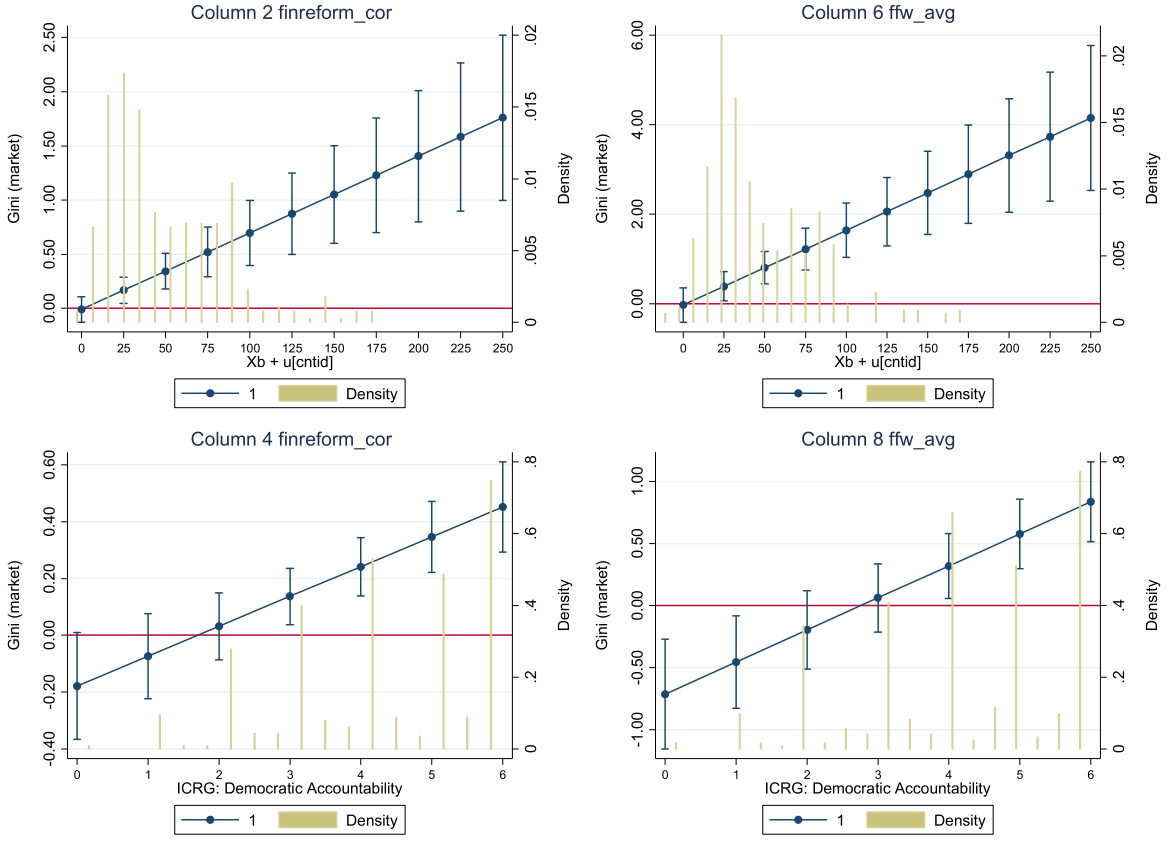

Fig. A2. Marginal effects of financial liberalization on the Gini coefficient for different values of financial development and political institutional quality estimated with G2SLS.

Table A1
Survey of previous cross-country studies on the impact of finance on income inequality.

Study:	LHS variable:	Finance measure:	Controls:	Method:	Conclusion:
Studies on the impact of financial liberalization					
Das and Mohapatra (2003)	Share of income owned by the jth quintile	Dating of capital account liberalization	Logarithm of per capita GDP, secondary school enrollment, government consumption, gross investment, "rule of law" measure, private credit normalized by GDP	11 countries that underwent capital account liberalization between 1986 and 1995, and a sample of eight "control" countries that were subject to no major capital account reforms in this time period	The mean share held by the top quintile rose by 1.3 percentage points, while there is no discernible change in the mean income share of the lowest quintile; FD insignificant
Agnello et al. (2012)	Net income Gini	Difference of index of Abiad et al. at beginning of window	Income, income squared, government size (-), openness,	62 countries, 5-year (non)overlapping windows, 1973–2005, OLS?	Reform (i.e. increase in liberalization) reduces inequality
Delis et al. (2014)	Gini coefficient; Theil index	Level of index of Abiad et al.	Income, population, openness, government expenditure (+), inflation, bank liquidity, education, left, law-order, transparency, EF (excl. financial freedom)	91 countries, 5-year period averages, 1973–2005, OLS, 2SLS, GMM	Liberalization reduces inequality
Christopoulos and McAdam (2016)	Net and gross Gini	Level of index of Abiad et al.		29 countries, 1975–2005, Panel unit root tests	Net Gini stabilized
Li and Yu (2014)	Gross Gini	Level of index of Abiad et al.; Financial development; Banking crises	Low secondary school enrolment dummy*FLI, secondary school enrolment, life expectancy, government consumption/ GDP (+), institutional quality, inflation, stock turnover, GDPpc growth, openness, private credit/GDP, crisis dummy, terms of trade	18 Asian countries, 1996–2005; annual data, fixed effects, in robustness test they use GMM to control for endogeneity	Significant interaction with schooling. Private credit has negative impact on equality. Banking crises cause more inequality
Jaumotte and Osuorio Buitron (2015)	Gross and net Gini	Level of index of Abiad et al.; Banking crises	ICT in capital stock; lagged income per capita; income pc*export share of China; top tax; union density; minimum wage; bank crisis; collective bargaining; unemployment benefits; regular contracts; temporary contracts	20 advanced countries; 1981–2010; annual data; 3SLS with year and country FE	Liberalization increases inequality; banking crises not significant
Furceri and Loungani (2015)	Gross Gini	Capital account liberalization (Chen-Ito index)	Current account reforms, regulation reforms	149 countries from 1970 to 2010; panel time and country FE	Liberalization increases inequality
Bumann and Lensink (2016)	Gross Gini	Capital account liberalization (Chen-Ito index)	Inflation, trade openness, secondary school enrolment, the age structure of the population, population growth and real per capita GDP growth	106 countries over the time period 1973 to 2008; five-year panel estimated by GMM	Liberalization only tends to lower income inequality if private credit over GDP exceeds 25 percent
Studies on the impact of financial development					
Li et al. (1998)	Gin (net and growth)	M2/GDP	Schooling, civil liberties, initial distribution of land. In sensitivity analysis: GDPpc, investment ratio, black market premium, terms of trade shocks, openness, arable area per capita	49 countries, 1947-94, 5-year periods, OLS and IV (lagged variables as instruments)	Increase in FD reduces inequality
Clarke et al. (2006)	Log Gini	Private credit/GDP and squared	Initial GDPpc, and its square, Risk of expropriation, ethno-linguistic fractionalization, government consumption (ns), inflation, services and industry/GDP	83 countries, cross-section and panel, 5 year averages, 1960-95, OLS, 2SLS. Use legal origin as instrument in cross-section and random IV for panel.	Negative relationship
Beck et al. (2007)	Growth of Gini	Private credit/GDP	Initial Gini, schooling, openness, GDP pc growth, GDP pc* Gini, inflation	65 countries, cross-section (panel), 1960–2005	Negative relationship

(continued on next page)

Table A1 *(continued)*

Studies on the impact of financial liberalization					
Study:	**LHS variable:**	**Finance measure:**	**Controls:**	**Method:**	**Conclusion:**
Kappel (2010)	Gini (poverty)	Credit and capital market indicators	Ethnic diversity, land distribution, government spending (-), education	78 countries, 1960–2006, annual, panel, OLS and TSLS (instruments are legal origin and latitude)	FD reduces inequality, also via capital market but weak link in less developed countries
Kim and Lin (2011)	Growth of Gini	Private credit, liquid liabilities, bank assets (and three indicators of stock market)	Initial values of income inequality, per-capita real GDP growth, education attainment, the inflation rate of the consumer price index, government spending over GDP (not shown), and trade openness.	65 countries, 1960–2005, IV threshold regressions. Instruments: initial FD, creditor rights, religious composition, ethnic fractionalization as well as legal origins	Only above threshold of FD does FD decrease inequality
Gimet and Lagoarde-Segot (2011)	Estimated household income inequality	Bank credit (spread, financial exports, liquid reserves)	GDP, GDPpc, openness, financial integration	1994–2002, 49 countries, panel Bayesian SVAR	More credit increases inequality
Jauch and Watzka (2012)	Gini (gross and net)	Private sector credit (bank deposits)	GDPpc, GDPpc squared, ethno-linguistic fractionalization, government consumption (ns), inflation, agriculture	Unbalanced dataset of up to 138 developed and developing countries over the years 1960 to 2008 (annual and 5-year); fixed country and time effects	More development leads to more inequality when controlling for country and time fixed effects
Hamori and Hashiguchi (2012)	Estimated household income inequality	M2/GDP and private credit to GDP	Trade/GDP, log GDP per capita, inflation, and interactions	126 countries, 1963–2002, annual fixed effects and GMM in dynamic model	Financial development reduces inequality
Jaumotte et al. (2013)	Gini	Private sector credit	Trade openness (average tariff rate and exports and imports/GDP) and financial openness (Chin-Ito index, FDI, equity and debt flows to GDP, stock of FDI to GDP). Other variables: ICT capital in total capital, share of people having at least secondary education, average years of education, share in agriculture and industry.	51 countries, panel, 1981–2003	More development leads to more inequality
Law et al. (2014)	Log Gini	Private sector credit, bank credit, branches	GDPpc, inflation, education, institutional quality	81 countries, cross-section, 1985–2010, threshold IV regression. Instruments used are legal origin, creditor rights and initial level of FD.	Conditional relationship: with high institutional quality FD reduces income inequality but under low quality no effect.
Kunieda et al. (2014)	Net Gini	Private credit to GDP	Log of per capita GDP; years of schooling; political risk (ICRG); democratic accountability (ICRG); financial openness (Lane-Milesi-Ferretti)	Cross country (119 countries) and panel (120 countries) with 5-year average 1985–2009; IV with legal origin as instrument in cross country; GMM in panel	FD reduces inequality in financially closed economies
Bahmani-Oskooee and Zhang (2015)	Log Gini	5 measures including private credit and bank credit	Log GDP, Log CPI, Log Gov consumption (+), log Trade	17 countries, time series	Only in three countries lasting equalizing effect
Denk and Cournede (2015)	Gini of disposable income	Value added of finance, intermediated credit and stock market capitalisation; Banking crises	Unemployment rate, average number of school years in the adult population, and openness to trade;	33 OECD countries, 1970–2011, country and time fixed effects and country-specific coefficients on time trend to control for trend increase in Gini in many countries	FD leads to more inequality (but not for value added). Banking crises not significant
Naceur and Zhang (2016)	Gini and poverty gap	Several dimensions of financial development (access, efficiency, deepening (bank credit to GDP), stability); Index of Abiad et al.	Log GDPpc, inflation, trade openness, government size	143 countries, 1961–2011, IV	FD reduces income inequality while FL increases income inequality
Studies on the impact of financial crises					

(continued on next page)

Table A1 *(continued)*

Studies on the impact of financial liberalization					
Study:	**LHS variable:**	**Finance measure:**	**Controls:**	**Method:**	**Conclusion:**
Baldacci et al. (2002)	Gini, quintiles and poverty indictors	Currency crises	Impact of currency crisis on the following channels: GDP cp, inflation, unemployment, education, health care and social security is analyzed	65 countries; cross-section analysis, comprising crisis-struck countries with control group	Currency crises are associated with increase in poverty and income inequality
Honahan (2005)	Gini	Banking crises	Inflation, economic freedom, region dummies, income pc	43 crises, comparison before and after crisis	No evidence for a significant difference between Gini coefficients before and after a banking crisis
Agnello and Sousa (2012)	Gini	Banking crises	Government size, income per capita, financial depth (i.e. domestic credit provided by the banking sector in percentage of GDP) and unemployment rate	62 OECD and non-OECD countries for the 1980–2006 period; panel analysis using GMM	In OECD countries a banking crisis reduces inequality, but in non-OECD rise in inequality before the onset of the crisis but no effect thereafter. Financial depth reduces inequality (only in OECD countries).

Table A2
Countries included.

Country/Obs.	Abiad et al.	EFW-areas	*Country/Obs.*	Abiad et al.	EFW-areas	*Country/Obs.*	Abiad et al.	EFW-areas	*Country/Obs.*	Abiad et al.	EFW-areas
Albania	2	2	El Salvador	4	4	Lesotho	0	2	Russia	3	3
Algeria	3	3	Estonia	3	3	Lithuania	1	1	Rwanda	0	5
Argentina	6	6	Ethiopia	4	1	Luxembourg	0	5	Senegal	4	4
Armenia	0	1	Fiji	0	3	Macedonia	0	2	Sierra Leone	0	4
Australia	7	7	Finland	6	6	Madagascar	3	3	Singapore	7	7
Austria	4	4	France	6	6	Malawi	0	5	Slovak Republic	0	3
Azerbaijan	2	2	Georgia	3	2	Malaysia	5	5	Slovenia	0	3
Bangladesh	7	7	Germany	6	6	Mali	0	4	South Africa	7	7
Barbados	0	3	Ghana	3	3	Mauritius	0	4	South Korea	7	7
Belarus	3	0	Greece	7	7	Mexico	7	7	Spain	5	5
Belgium	6	6	Guatemala	4	4	Moldova	0	2	Sri Lanka	6	6
Bolivia	5	5	Guinea-Bissau	0	3	Mongolia	0	3	Sweden	7	7
Botswana	0	4	Guyana	0	2	Morocco	5	5	Switzerland	4	4
Brazil	6	6	Haiti	0	1	Mozambique	2	1	Syria	0	1
Bulgaria	3	3	Honduras	0	4	Namibia	0	3	Tanzania	4	4
Burkina Faso	2	0	Hong Kong	4	4	Nepal	3	3	Thailand	5	5
Burundi	0	2	Hungary	3	3	Netherlands	6	6	Togo	0	1
Cameroon	2	2	Iceland	0	3	New Zealand	7	7	Trinidad and Tobago	0	3
Canada	7	7	India	7	7	Nicaragua	2	2	Tunisia	5	5
Central African Republic	0	2	Indonesia	6	6	Niger	0	2	Turkey	5	5
Chile	6	6	Iran	0	6	Nigeria	5	5	Uganda	4	4
China	5	6	Ireland	6	6	Norway	7	7	Ukraine	3	3
Colombia	7	7	Israel	6	6	Pakistan	7	7	United Kingdom	7	7
Costa Rica	5	5	Italy	6	6	Panama	0	7	United States	7	7
Cote d'Ivoire	4	4	Jamaica	3	3	Papua New Guinea	0	2	Uruguay	7	7
Croatia	0	3	Japan	7	7	Paraguay	4	4	Venezuela	7	7
Czech Republic	3	3	Jordan	5	5	Peru	5	5	Vietnam	3	2
Denmark	7	7	Kazakhstan	3	2	Philippines	5	5	Yugoslavia	0	1
Dominican Republic	5	5	Kenya	5	5	Poland	4	4	Zambia	0	4
Ecuador	5	5	Kyrgyz Republic	3	3	Portugal	6	6	Zimbabwe	3	3
Egypt	5	5	Latvia	3	3	Romania	2	2			
Total countries	89	121									
Total observations	426	518									

Table A3
Variables: Description and sources.

Variable	Description	Source
Main variables		
gini	Gini coefficient using (pre-tax, pre-transfer) household income	SWIID
dumsysbankcr	Start of a Systemic Banking Crisis	Laeven and Valencia
domcredgdp	Domestic credit to private sector (% of GDP)	WDI
finreform_corr	Financial liberalisation: Abiad et al. index (corrected)	Abiad et al.
ffw_avg	Average of EFW-areas 3D, 4C, 4D and 5A	EFW
Interaction variables		
instqual	Institutional Quality (corru burea law_a democ)	ICRG
democ	Democratic Accountability	ICRG
Additional variables		
govconsgdp	General government final consumption expenditure (% of GDP)	WDI
lrgdppc	Log(GDP per capita - constant 2005 US$)	WDI
tradegdp	Trade (% of GDP)	WDI
lpop	Log(Population)	WDI
inflation	Inflation, consumer prices (annual %)	WDI
grrgdp	GDP growth (annual %)	WDI
agrshare	Agriculture, value added (% of GDP)	WDI
indshare	Industry, value added (% of GDP)	WDI
natresshare	Total natural resources rents (% of GDP)	WDI
efw_avg	Average of non-financial EFW-areas	EFW
kaopen	Chinn-Ito index	Chinn and Ito
left	Orientation of the Chief Executive Party is left-wing	DPI
civlib	Freedom in the World: Civil Liberties	Freedom House
eduexpgni	Adjusted savings: education expenditure (% of GNI)	WDI
schoolenrprim	School enrollment, primary (% gross)	WDI
schoolenrsec	School enrollment, secondary (% gross)	WDI
schoolenrtert	School enrollment, tertiary (% gross)	WDI
glob_act_flows	Economic Globalization: Actual Flows	KOF
glob_restr	Economic Globalization: Restrictions	KOF
glob_soc	Social Globalization	KOF
glob_pol	Political Globalization	KOF
polrel	Ethnic Polarization (relevant groups), EPR	EPR-ETH
elfrel	Ethnic Fractionalization (relevant groups), EPR	EPR-ETH
lifeexpect	Life expectancy at birth, total (years)	WDI
termsoftrade	Net barter terms of trade index (2000 = 100)	WDI
fdigdp	Foreign direct investment, net inflows (% of GDP)	WDI
gfcfgdp	Gross fixed capital formation (% of GDP)	WDI
dumcurcr	Start of a Currency Crisis	Laeven and Valencia
dumsovdebtcr	Sovereign Debt Crisis (default date)	Laeven and Valencia
dumsovdebtrestruct	Sovereign Debt Restructuring year	Laeven and Valencia

Table A4
Summary statistics.

Variable	Obs	Mean	St. Dev.	Min	Max	Correlation with					
						1	2	3	4	5	6
Main variables											
1 gini	530	45.37	7.26	22.66	69.85	1					
2 dumsysbankcr	530	0.16	0.36	0	1	0.07	1				
3 domcredgdp	530	46.06	39.45	1.19	240.34	0.05	−0.14	1			
4 finreform_corr	426	11.13	5.06	0	18	0.20	−0.10	0.43	1		
5 ffw_avg	518	6.55	2.44	0	10	0.07	−0.14	0.44	0.74	1	
6 democ	419	4.14	1.47	0	6	0.04	−0.12	0.42	0.48	0.48	1
Additional variables											
govconsgdp	524	15.21	5.37	3.14	40.05	0.09	−0.06	0.23	0.25	0.20	0.38
lrgdppc	525	8.19	1.63	4.85	11.28	0.02	−0.14	0.64	0.49	0.55	0.66
tradegdp	528	73.70	53.98	11.00	422.33	−0.02	−0.07	0.22	0.33	0.32	−0.02
lpop	530	16.48	1.55	12.48	20.99	−0.06	0.03	0.08	−0.23	−0.22	−0.10
inflation	484	11.49	15.00	−4.00	99.16	0.06	0.20	−0.32	−0.37	−0.34	−0.21
grrgdp	522	3.89	4.09	−13.23	35.22	−0.03	−0.04	0.01	0.02	0.05	−0.13
agrshare	459	15.82	13.65	0.06	61.95	−0.13	0.09	−0.55	−0.55	−0.57	−0.54
indshare	458	30.52	9.03	8.67	61.21	−0.02	0.01	0.08	−0.02	0.05	0.00
natresshare	527	6.82	9.84	0	55.15	−0.09	0.06	−0.30	−0.16	−0.23	−0.33
efw_avg	512	6.24	1.20	2.33	9.69	−0.01	−0.21	0.57	0.67	0.67	0.45
kaopen	505	0.19	1.52	−1.89	2.39	0.01	−0.15	0.49	0.70	0.75	0.50
left	526	0.32	0.47	0	1	0.03	−0.01	0.06	−0.06	−0.03	0.11
civlib	526	3.09	1.65	1	7	−0.05	0.13	−0.43	−0.40	−0.51	−0.74
eduexpgni	525	3.99	2.59	0.60	43.27	0.13	0.01	0.16	0.20	0.12	0.16
schoolenrprim	481	98.89	16.39	29.10	161.13	0.17	−0.04	0.19	0.21	0.28	0.27
schoolenrsec	413	71.30	30.57	5.31	160.62	−0.07	−0.05	0.51	0.60	0.57	0.67
schoolenrtert	397	27.43	21.47	0.33	93.48	−0.03	−0.02	0.47	0.62	0.55	0.56
glob_act_flows	522	52.41	21.03	6.35	99.52	0.17	−0.05	0.28	0.53	0.48	0.34
glob_restr	516	53.85	23.36	4.26	97.32	0.03	−0.16	0.55	0.65	0.71	0.66
glob_soc	522	45.03	22.32	6.59	93.10	−0.02	−0.12	0.58	0.68	0.66	0.66
glob_pol	522	65.96	19.52	21.65	98.04	−0.05	−0.05	0.38	0.42	0.35	0.51
fdi_st_gdp	487	14.09	17.79	0	156.01	0.14	−0.11	0.34	0.46	0.35	0.22
linc_gdp	493	−3.26	0.94	−7.44	1.04	0.27	−0.01	0.20	0.39	0.33	0.20
polrel	515	45.93	29.01	0	99.38	0.08	0.00	−0.15	−0.02	−0.11	−0.22
elfrel	515	36.79	27.59	0	92.82	0.11	0.01	−0.20	−0.09	−0.21	−0.33
lifeexpect	530	67.70	9.75	31.24	81.93	−0.14	−0.08	0.56	0.46	0.56	0.56
termsoftrade	375	106.98	29.76	21.40	315.63	0.03	0.08	−0.11	−0.16	−0.16	−0.16
fdigdp	510	2.71	4.05	−3.62	36.07	0.06	−0.05	0.21	0.38	0.35	0.09
gfcfgdp	521	21.93	6.50	1.10	70.13	−0.13	−0.17	0.32	0.04	0.20	0.15
instqual	419	3.61	1.38	0.333	6	−0.03	−0.14	0.61	0.48	0.50	0.65
dumcurcr	530	0.22	0.42	0	1	0.05	0.33	−0.29	−0.26	−0.29	−0.18
dumsovdebtcr	530	0.05	0.23	0	1	0.04	0.19	−0.10	−0.17	−0.15	−0.09
dumsovdebtrestruct	530	0.09	0.29	0	1	0.08	0.22	−0.17	−0.01	−0.07	−0.13

Table A5
Correlation matrix.

	Variable/Correlation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	govconsgdp	1																	
2	lrgdppc	0.43	1																
3	tradegdp	0.06	0.21	1															
4	lpop	−0.24	−0.16	−0.47	1														
5	inflation	−0.04	−0.19	−0.15	0.04	1													
6	grrgdp	−0.15	−0.10	0.11	0.07	−0.29	1												
7	agrshare	−0.33	−0.85	−0.26	0.08	0.19	0.03	1											
8	indshare	0.02	0.27	0.03	0.17	0.11	0.05	−0.44	1										
9	natresshare	−0.24	−0.34	−0.13	0.16	0.14	0.07	0.26	0.33	1									
10	efw_avg	0.17	0.55	0.41	−0.19	−0.60	0.04	−0.51	−0.02	−0.31	1								
11	kaopen	0.22	0.55	0.25	−0.12	−0.38	−0.02	−0.48	0.00	−0.24	0.61	1							
12	left	0.09	0.08	−0.12	0.07	0.02	0.00	−0.07	−0.01	−0.08	−0.04	−0.05	1						
13	civlib	−0.39	−0.75	−0.06	0.25	0.18	0.13	0.58	−0.04	0.37	−0.43	−0.48	−0.15	1					
14	eduexpgni	0.46	0.20	0.08	−0.18	−0.11	−0.15	−0.19	0.02	−0.10	0.15	0.10	0.01	−0.18	1				
15	schoolenrprim	0.06	0.33	0.11	−0.01	0.09	0.05	−0.46	0.31	−0.12	0.19	0.21	0.05	−0.24	0.09	1			
16	schoolenrsec	0.46	0.82	0.19	−0.17	−0.13	−0.10	−0.74	0.14	−0.32	0.53	0.55	0.09	−0.68	0.21	0.34	1		
17	schoolenrtert	0.36	0.66	0.11	−0.07	−0.16	−0.07	−0.63	0.08	−0.21	0.47	0.58	−0.02	−0.56	0.43	0.18	0.80	1	
18	glob_act_flows	0.29	0.44	0.67	−0.49	−0.20	0.04	−0.52	0.22	−0.06	0.45	0.39	−0.01	−0.37	0.23	0.22	0.46	0.39	1
19	glob_restr	0.44	0.81	0.31	−0.20	−0.25	−0.01	−0.68	0.14	−0.38	0.64	0.65	0.07	−0.66	0.17	0.29	0.78	0.66	0.47
20	glob_soc	0.46	0.85	0.38	−0.24	−0.28	−0.04	−0.74	0.12	−0.35	0.63	0.63	0.08	−0.69	0.24	0.28	0.82	0.75	0.58
21	glob_pol	0.20	0.52	−0.13	0.30	−0.21	−0.04	−0.46	0.09	−0.17	0.26	0.37	0.14	−0.48	0.12	0.17	0.51	0.49	0.20
22	fdi_st_gdp	0.17	0.37	0.56	−0.24	−0.20	0.07	−0.36	0.08	−0.07	0.40	0.37	−0.02	−0.25	0.09	0.10	0.36	0.35	0.66
23	linc_gdp	0.16	0.30	0.47	−0.40	−0.09	0.00	−0.34	0.12	−0.01	0.27	0.32	−0.02	−0.28	0.24	0.12	0.26	0.22	0.81
24	polrel	−0.09	−0.26	0.11	0.00	0.12	0.06	0.15	−0.07	0.12	−0.07	−0.08	−0.12	0.27	0.03	−0.09	−0.21	−0.10	0.02

(continued on next page)

Table A5 *(continued)*

	Variable/Correlation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
25	elfrel	−0.12	−0.45	0.00	0.07	0.06	0.09	0.41	−0.18	0.25	−0.17	−0.16	−0.02	0.35	−0.04	−0.19	−0.39	−0.26	−0.09
26	lifeexpect	0.26	0.81	0.24	−0.07	−0.19	−0.01	−0.77	0.25	−0.36	0.53	0.50	0.08	−0.60	0.08	0.45	0.81	0.66	0.39
27	termsoftrade	−0.05	−0.11	−0.11	0.01	0.15	0.05	0.15	−0.03	0.24	−0.23	−0.06	0.07	0.15	−0.07	−0.17	−0.18	−0.13	−0.13
28	fdigdp	0.09	0.15	0.57	−0.26	−0.16	0.12	−0.20	−0.05	−0.06	0.38	0.28	0.02	−0.12	0.05	0.10	0.20	0.21	0.52
29	gfcfgdp	0.16	0.25	0.28	0.04	−0.17	0.17	−0.31	0.30	−0.17	0.31	0.15	0.10	−0.11	0.03	0.17	0.15	0.08	0.15
30	instqual	0.51	0.80	0.19	−0.13	−0.26	−0.05	−0.60	0.09	−0.34	0.57	0.51	0.12	−0.60	0.26	0.19	0.68	0.52	0.39
31	dumcurcr	−0.17	−0.22	−0.11	0.02	0.40	0.02	0.16	0.09	0.22	−0.38	−0.30	−0.03	0.19	0.00	−0.07	−0.17	−0.13	−0.08
32	dumsovdebtcr	−0.07	−0.08	−0.06	0.02	0.11	−0.03	0.01	0.05	0.12	−0.18	−0.14	0.01	0.07	−0.05	0.04	−0.09	−0.02	0.03
33	dumsovdebtrestruct	−0.18	−0.17	−0.04	0.00	0.10	0.03	0.09	0.00	0.11	−0.11	−0.11	0.02	0.11	−0.11	−0.05	−0.12	−0.08	0.00

	Variable/Correlation	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
19	glob_restr	1														
20	glob_soc	0.86	1													
21	glob_pol	0.47	0.52	1												
22	fdi_st_gdp	0.42	0.48	0.19	1											
23	linc_gdp	0.29	0.38	0.12	0.55	1										
24	polrel	−0.20	−0.14	−0.19	0.01	−0.01	1									
25	elfrel	−0.34	−0.34	−0.24	−0.05	−0.04	0.74	1								
26	lifeexpect	0.71	0.76	0.47	0.26	0.22	−0.22	−0.49	1							
27	termsoftrade	−0.15	−0.17	−0.13	−0.09	−0.01	−0.04	0.07	−0.21	1						
28	fdigdp	0.28	0.33	0.02	0.52	0.38	0.02	−0.04	0.18	−0.11	1					
29	gfcfgdp	0.29	0.23	0.06	0.08	−0.02	−0.19	−0.25	0.34	−0.08	0.25	1				
30	instqual	0.72	0.75	0.43	0.33	0.26	−0.22	−0.30	0.62	−0.17	0.19	0.32	1			
31	dumcurcr	−0.29	−0.27	−0.12	−0.13	0.02	0.09	0.07	−0.21	0.06	−0.13	−0.22	−0.26	1		
32	dumsovdebtcr	−0.18	−0.11	−0.06	−0.05	0.12	0.03	0.01	−0.05	0.20	−0.10	−0.16	−0.15	0.33	1	
33	dumsovdebtrestruct	−0.17	−0.15	−0.07	−0.06	0.05	0.04	0.07	−0.12	−0.02	−0.05	−0.16	−0.15	0.05	0.18	1

Table A6
Main results when adding GDP per capita or real GDP growth.

VARIABLES	Abiad et al. index (corrected)			Avg.of specific EFW-areas		
	(1)	(2)	(3)	(4)	(5)	(6)
Start of a Systemic Banking Crisis during t-7 and t-3	0.940***	0.973***	0.898**	0.951**	1.043***	0.908**
	(2.661)	(2.696)	(2.592)	(2.548)	(2.817)	(2.474)
Domestic credit to private sector (% of GDP)	0.0297***	−0.00286	0.00268	0.0305***	−0.0141	−0.000675
	(3.002)	(−0.0817)	(0.0713)	(3.457)	(−0.380)	(−0.0185)
Financial liberalisation	−0.146	−0.178	−0.152	−0.639*	−0.707**	−0.663*
	(−1.197)	(−1.512)	(−1.288)	(−1.908)	(−2.204)	(−1.959)
c.domcredgdp#c.finlib		0.00141	0.00162		0.00354	0.00361
		(0.724)	(0.798)		(0.896)	(0.900)
ICRG: Democratic Accountability	−1.641***	−1.431***	−1.531***	−2.146***	−1.884***	−2.001***
	(−3.452)	(−3.078)	(−2.792)	(−3.487)	(−3.044)	(−3.211)
c.democ#c.finlib	0.0895***	0.0689**	0.0784**	0.224***	0.171**	0.199**
	(2.920)	(2.064)	(2.122)	(2.928)	(2.217)	(2.567)
Log(GDP per capita - constant 2005 US$)		2.453			3.715***	
		(1.570)			(2.811)	
Real GDP growth (annual %)			−0.0349			0.00102
			(−0.817)			(0.0229)
Observations	345	342	343	410	406	407
R-squared	0.219	0.242	0.224	0.162	0.205	0.167
Number of cntid	86	85	85	110	108	108
Hausman test (p-value)	0.000151	0.00615	2.53e-06	0.0781	0.0136	4.04e-05
F-test on finlib (p-value)	0.000105	0.00847	0.000384	0.00135	0.0672	0.00399
F-test on democ (p-value)	0.00378	0.00708	0.0182	0.00259	0.00336	0.00467
F-test on domcredgdp (p-value)		0.0915	0.00412		0.0625	0.00198

Notes: Country-fixed effects are included. Robust t-statistics in parentheses. Standard errors clustered at the country level.
*** $p < 0.01$,
** $p < 0.05$,
* $p < 0.1$.

Table A7
Main results when including time dummies.

VARIABLES	Abiad et al. index (corrected)		Avg.of specific EFW-areas	
	(1)	(2)	(3)	(4)
Start of a Systemic Banking Crisis during t-7 and t-3	0.810*	0.734**	1.154***	0.829**
	(1.926)	(2.010)	(2.704)	(2.179)
Domestic credit to private sector (% of GDP)	−0.0127	0.0188*	−0.0215	0.0232***
	(−0.386)	(1.889)	(−0.533)	(2.623)
Financial liberalisation	−0.0606	−0.363***	−0.168	−0.835***
	(−0.704)	(−3.413)	(−0.783)	(−2.641)
c.domcredgdp#c.finlib	0.00364**		0.00766*	
	(2.025)		(1.740)	
ICRG: Democratic Accountability		−1.570***		−2.100***
		(−3.762)		(−3.375)
c.democ#c.finlib		0.0825***		0.207**
		(2.989)		(2.587)
Observations	345	342	410	406
R-squared	0.268	0.274	0.202	0.226
Number of cntid	86	85	110	108
Hausman test (p-value)	1.50e-08	5.60e-08	0.000150	0.00269
Number of periods	5	5	5	5
F-test on finlib (p-value)	0.131	0.00385	0.161	0.0309
F-test on domcredgdp (p-value)	0.000189		0.000464	
F-test on democ (p-value)		0.00143		0.00248

Notes: Country-fixed effects are included. Robust t-statistics in parentheses. Standard errors clustered at the country level.
*** $p < 0.01$,
** $p < 0.05$,
* $p < 0.1$.

References

Abiad, A., Detragiache, E., Tressel, T., 2010. A new database of financial reforms. IMF Staff Pap. 57, 281–302.
Abiad, A., Oomes, N., Ueda, K., 2008. The quality effect: does financial liberalization improve the allocation of capital? J. Dev. Econ. 87, 270–282.
Acemoglu, D., Johnson, S., 2005. Unbundling institutions. J. Political Econ. 113, 949–995.
Acemoglu, D., Robinson, J.A., 2013. Why Nations Fail. The Origins of Power, Prosperity and Poverty. Penguin Random House, New York.
Agnello, L., Mallick, S.K., Sousa, R.M., 2012. Financial reforms and income inequality. Econ. Lett. 116, 583–587.
Agnello, L., Sousa, R.M., 2012. How do banking crises impact on income inequality? Appl. Econ. Lett. 19, 1425–1429.
Arcand, J., Berkes, E., Panizza, U., 2012. Too much finance? IMF Working Paper 12/161.
Atkinson, A.B., Morelli, S., 2011. Economic crises and inequality. UNDP-HDRO Occasional Papers 2011/6.
Bahmani-Oskooee, M., Zhang, R., 2015. On the impact of financial development on income distribution: time-series evidence. Appl. Econ. 47, 1248–1271.
Baldacci, E., de Mello, L., Inchauste, G., 2002. Financial crises, poverty and income distribution. IMF Working Paper 02/4, International Monetary Fund, Washington.
Banerjee, A.V., Newman, A.F., 1993. Occupational choice and the process of development. J. Political Econ. 101, 274–298.
Beck, T., Demirgüç-Kunt, A., Levine, R., 2007. Finance, inequality and the poor. J. Econ. Growth 12, 27–49.
Beck, T., Levine, R., Levkov, A., 2010. Big bad banks? The winners and losers from bank deregulation in the United States. J. Financ. 65, 1637–1667.
Bergh, A., 2005. On the counterfactual problem of welfare state research: how can we measure redistribution? Eur. Sociol. Rev. 21 (4), 345–357.
Bergh, A., Nilsson, T., 2010. Do liberalization and globalization increase income inequality? Eur. J. Political Econ. 26, 488–505.
Bordo, M.D., Meissner, C.M., 2012. Does inequality lead to a financial crisis? J. Int. Money Financ. 31, 2147–2161.
Brambor, T., Clark, W., Golder, M., 2006. Understanding interaction models: improving empirical analysis. Political Anal. 14, 63–82.
Bumann, S., Lensink, R., 2016. Capital account liberalization and income inequality. J. Int. Money Financ. 61, 143–162.
Cecchetti, S., Kharroubi, E., 2012. Reassessing the impact of finance on growth. BIS Working Paper 381.
Chaudron, R., de Haan, J., 2014. Dating banking crises using incidence and size of bank failures: four crises reconsidered. J. Financ. Stab. 15, 63–75.
Christopoulos, D., McAdam, P., 2016. Do financial reforms help stabilize inequality? J. Int. Money Financ. 68, 45–61.
Chong, A., Gradstein, M., 2007. Inequality and institutions. Rev. Econ. Stat. 89, 454–465.
Čihák, M., Demirgüç-Kunt, A., Feyen, E., Levine, R., 2012. Benchmarking financial systems around the world. World Bank Policy Research Working Paper 6175. World Bank, Washington DC.
Claessens, S., Perotti, E., 2007. Finance and inequality: channels and evidence. J. Comp. Econ. 35, 748–773.
Clarke, G., Xu, L.C., Zou, H., 2006. Finance and income inequality: what do the data tell us? South. Econ. J. 72, 578–596.
Dabla-Norris, E., Kochhar, K., Ricka, F., Suphaphiphat, N., Tsounta, E., 2015. Causes and consequences of income inequality: a global perspective. IMF Staff Discussion Note 15/13, IMF, Washington DC.
Das, M., Mohapatra, S., 2003. Income inequality: the aftermath of stock market liberalization in emerging markets. J. Empir. Financ. 10, 217–248.
Delis, M.D., Hasan, I., Kazakis, P., 2014. Bank regulations and income inequality: empirical evidence. Rev. Financ. 18, 1811–1846.
Demirgüç-Kunt, A., Levine, R., 2009. Finance and inequality: theory and evidence. Annu. Rev. Financ. Econ. 1, 287–318.
Denk, O., 2015. Financial sector pay and labour income inequality: evidence from Europe (OECD Economics Department Working Paper 1225). OECD Publishing, Paris.
Denk, O., Cournède, B., 2015. Finance and income inequality in OECD countries (OECD Economics Department Working Paper 1224). OECD Publishing, Paris.
Dreher, A., 2006. Does globalization affect growth? Evidence from a new index of globalization. Appl. Econ. 38 (10), 1091–1110.
Furceri, D., Loungani, P., 2015. Capital account liberalization and inequality. IMF Working Paper 15/243.
Galbraith, J.K., 2012. Inequality and instability. Oxford University Press, Oxford.
Galor, O., Moav, O., 2004. From physical to human capital accumulation: inequality and the process of development. Rev. Econ. Stud. 71, 1001–1026.
Gimet, C., Lagoarde-Segot, T., 2011. A closer look at financial development and income distribution. J. Bank. Financ. 35, 1698–1713.
Greenwood, J., Jovanovic, B., 1990. Financial development, growth, and the distribution of income. J. Political Econ. 98, 1076–1107.
Gu, X., Huang, B., 2014. Does inequality lead to a financial crisis? Revisited. Rev. Dev. Econ. 18, 502–516.
Gwartney, J., Lawson, R., Hall, J., 2015. Economic freedom of the world. Available at: ⟨www.freetheworld.com⟩.
Hamori, S., Hashiguchi, Y., 2012. The effect of financial deepening on inequality: some international evidence. J. Asian Econ. 23, 353–359.
Honohan, P., 2005. Banking sector crises and inequality (World Bank Policy Research Working Paper 3659). World Bank, Washington DC.
Jauch, S., Watzka, S., 2012. Financial development and income inequality: a panel data approach (CESifo Working Papers 3687). CESifo, Munich.
Jaumotte, F., Lall, S., Papageorgiou, C., 2013. Rising income inequality: technology, or trade and financial globalization? IMF Econ. Rev. 61, 271–309.
Jaumotte, F., Osorio Buitron, C., 2015. Inequality and labor market institutions (IMF Staff Discussion Note 15/14). IMF, Washington DC.
Jenkins, S.J., 2015. World income inequality databases: an assessment of WIID and SWIID. J. Econ. Inequal. 13, 629–671.
Kappel, V., 2010. The effects of financial development on income inequality and poverty (CER-ETH Working Paper 10/127). ETH, Zürich.
Kim, D., Lin, S., 2011. Nonlinearity in the financial development-income inequality nexus. J. Comp. Econ. 39, 310–325.
Kumhof, M., Rancière, R., 2011. Inequality, leverage and crises (IMF Working Paper 10/268). IMF, Washington DC.
Kunieda, T., Okada, K., Shibata, A., 2014. Finance and inequality: how does globalization change their relationship? Macroecon. Dyn. 18, 1091–1128.
Laeven, L., Valencia, F., 2013. Systemic banking crises database. IMF Econ. Rev. 61, 225–270.
Lane, P.R., Milesi-Ferretti, G.M., 2007. The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004. J. Int. Econ. 73, 223–250.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1997. Legal determinants of external finance. J. Financ. 52, 1131–1150.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and finance. J. Political Econ. 106, 1113–1155.
Law, S.H., Azman-Saini, W.N.W., 2012. Institutional quality, governance, and financial development. Econ. Gov. 13, 217–236.
Law, S.H., Tan, H.B., Azman-Saini, W.N.W., 2014. Financial development and income inequality at different levels of institutional quality. Emerg. Mark. Financ. Trade 50, 21–33.
Levine, R., 2005. Finance and growth: theory and evidence. In: Aghion, P., Durlauf, S. (Eds.), Handbook of Economic Growth. Elsevier, Amsterdam, 865–934.
Li, H., Squire, L., Zou, H., 1998. Explaining international and intertemporal variations in income distribution. Econ. J. 108, 26–43.
Li, J., Yu, H., 2014. Income inequality and financial reform in Asia: the role of human capital. Appl. Econ. 46, 2920–2935.
Manski, C., 2012. Income tax and labour supply: Let's acknowledge what we don't know. VOXEU 23 August 2012. ⟨http://voxeu.org/article/income-tax-and-labour-supply-let-s-acknowledge-what-we-don-t-know⟩ (last time assessed: 3 January 2017).
Naceur, S.B., Zhang, R., 2016. Financial development, inequality and poverty: some international evidence (IMF Working Paper 16/32). IMF, Washington DC.
OECD, 2013. Crisis squeezes income and puts pressure on inequality and poverty. OECD Publishing, Paris.
Philippon, T., Reshef, A., 2013. An international look at the growth of modern finance. J. Econ. Perspect. 27, 73–96.
Rancière, R., Tornell, A., Westermann, F., 2008. Financial liberalization. In: Durlauf, S.N., Blume, L.E. (eds.), The New Palgrave Dictionary of Economics, Second Edition, 2008.
Rajan, R.G., Zingales, L., 2003. The great reversals: the politics of financial development in the twentieth century. J. Financ. Econ. 69, 5–50.
Schularick, M., Taylor, A.M., 2012. Credit booms gone bust. Monetary policy, leverage cycles and financial crises, 1870–2008. Am. Econ. Rev. 102, 1029–1061.
Solt, F., 2009. Standardizing the world income inequality database. Social. Sci. Quar. 90, 231–242.
Solt, F., 2015. On the assessment and use of cross-national income inequality datasets. J. Econ. Inequal. 13, 683–691.
Sturm, J.-E., de Haan, J., 2015. Income inequality, capitalism and ethno-linguistic fractionalization. Am. Econ. Rev. (Pap. Proc.) 105, 593–597.