



Has the Global Financial Crisis increased wealth inequality?

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ABSTRACT

This paper examines the impact of the Global Financial Crisis (GFC) on wealth inequality. We investigate this question, using data for 143 countries for the period 2010–2018. We find no significant impact of the occurrence of the crisis on wealth inequality. We show limited evidence that the severity of the banking crisis affects the change in wealth inequality. Furthermore, the impact of the GFC on the change in wealth inequality is influenced by the country characteristics: the GFC has more enhanced wealth inequality in countries with higher levels of economic and financial development as well as lower initial levels of wealth inequality. We therefore contribute to a better understanding of the real effects of banking crises by providing evidence of the distributional effects of the GFC.

1. Introduction

Banking crises are common events in developed and developing countries with 151 episodes identified by [Laeven and Valencia \(2020\)](#) between 1970 and 2017. They have been shown to have detrimental effects on the economy by causing output losses ([Kroszner et al., 2007](#); [Dell'Ariccia et al., 2008](#); [Devereux and Dwyer, 2016](#)) and fiscal costs related to banking crisis resolution ([Amaglobeli et al., 2015](#); [Laeven and Valencia, 2018](#)).

Banking crises can also exert distributional effects on the households and thus influence inequality within societies. Surprisingly, these effects have been widely ignored in the literature in spite of the widespread concerns about inequalities. We are only aware of two studies contributing to the analysis of the distributional effects of banking crises. Both these works investigate the influence of banking crises on income inequality: while [Agnello and Sousa \(2012\)](#) find a decline in income inequality following banking crisis episodes, [De Haan and Sturm \(2017\)](#) conclude that banking crises increase income inequality.

Our objective in this paper is to provide the first investigation of the impact of banking crises on wealth inequality by examining the aftermath of the Global Financial Crisis (GFC). According to the World Inequality Database, the GFC has been followed by a rise of the share of the richest 10% individuals in the largest economies: +2.4 points for the US (from 68.4% to 70.8%), +11.6 points for China (from 55.8% to 67.4%), and +2.3 points for France (from 56.6% to 58.9%) between 2007 and 2018. It is not, however, a general worldwide trend since some G20 countries had a reduction over the same period (−2.8 points for South Africa) or a stagnation (+0.2 points for South Korea). While income inequality has come to the forefront of the public debate (e.g., [Milanovic, 2016](#)), wealth inequality is much more ignored and has been much less investigated in the literature.¹

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¹ Recent literature on wealth inequality includes [Jones \(2015\)](#) and [Cowell and Van Kerm \(2015\)](#) for overviews of the literature, [Saez and Zucman \(2016\)](#) for the evolution in the US.

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Wealth inequality is, however, an issue of major economic concern. From a conceptual perspective, wealth appears to be more important than income since wealth generates income. As such, wealth inequality is a driving force of income inequality. From the perspective of the consequences, wealth inequality can have a major influence on the economy. On the one hand, higher wealth inequality may have beneficial economic effects by giving incentives to individuals to work hard and thus stimulating growth. On the other hand, it can reduce social mobility and lead to unequal opportunities (Pfeffer and Schoeni, 2016; Killewald et al., 2017). It would then be detrimental for the economy since it reduces the incentives for individuals to use at best their skills. Higher wealth inequality can furthermore favor the emergence of a plutocracy, a society ruled by the rich, with detrimental economic effects: wealthiest individuals may then exert a disproportionate political influence and shape society in line with their interests at the expense of the general welfare (Bartels, 2008; Page et al., 2013).

This paper analyzes the impact of the GFC on wealth inequality. The GFC provides a unique opportunity to investigate the effects of a banking crisis on wealth inequality. It represents a massive shock affecting many countries at the same time and we can thus scrutinize how countries have been impacted in terms of wealth inequality. A key challenge in the investigation of the link between banking crises and wealth inequality deals with the availability of data on wealth inequality. While data on income inequality are easy to obtain, those on wealth inequality are much harder to get notably due to constrained access to the wealth of individuals. However, we have data on wealth inequality for the whole period following the GFC on a large set of countries hampered by this banking crisis. We exploit data on wealth inequality from the Credit Suisse Global Wealth Report for the period 2010–2018. We merge this dataset with the information on banking crises from Laeven and Valencia (2020) so that we can characterize the aftermath of the GFC in terms of variation in wealth inequality. We consider the occurrence of the banking crisis, but we also take into account the severity of the banking crisis through two indicators: the output loss, and the fiscal cost.

Literature has shown that a banking crisis exerts effects on income and wealth inequality through three broad categories of transmission channels (Bazillier and Héricourt, 2017; Colciago et al., 2019; Mathonnat and Williams, 2020). First, a banking crisis affects inequality through financial transmission channels by exerting an influence on asset prices and access to the credit market. Second, a banking crisis also matters through monetary transmission channels since changes in interest rates exert wealth effects on the financial wealth. Third, banking crises influence inequality through real economy channels: they contribute to enhance unemployment and exert an impact on fiscal policies affecting income redistribution.

Given these transmission channels, the impact of the GFC on wealth inequality is a priori ambiguous. On the one hand, a set of arguments supports the view that the GFC has increased wealth inequality. First, the richest individuals have a lower share of their wealth in real estate assets than the rest of the population (OECD, 2018). Many households have only dwelling as their wealth. As a consequence, if the GFC had a greater impact on real estate assets than on other components of wealth, it would deteriorate less - proportionally - the wealth of the richest individuals than the wealth of the rest of the population. Second, the GFC has been followed by an economic downturn, which had heterogeneous effects on the members of the society. The observed rise of unemployment has particularly affected the poorest members of the society, who may have been forced to diminish savings to maintain their standard of living. Third, the fiscal costs of the GFC can have contributed to reduce redistribution in favor of the poorest households. It has indeed contributed to the implementation of fiscal austerity policies in many countries. This could be an additional reason for them to consume their savings and as such to reduce their wealth.

On the other hand, the GFC might have reduced wealth inequality. A banking crisis generates a fall of prices of financial assets because of asset selling by indebted economic agents looking for liquidity. It consequently leads to wealth losses, which hit more the top quantiles of the wealth distribution. Since the poorest individuals of the society have low and even null wealth in financial assets, their wealth has been much less affected by the GFC than the wealth of the richest individuals. The distributional effects of the GFC are therefore uncertain and require an empirical investigation.

The transmission channels explaining the effect of the GFC on wealth inequality can differ for developed, emerging, and developing countries. These countries differ not only in terms of economic development but also in terms of financial development, and initial levels of wealth inequality. Namely, developed countries are overall associated with higher financial development, and lower initial level of wealth inequality. As a consequence, the effect of the GFC can vary with the type of countries in terms of economic development. Economic development affects the impact of the GFC through the real economy channels. More developed economies have on average greater income redistribution, which means that they can absorb more real effects of financial crises. As explained by Bazillier and Héricourt (2017), a higher level of financial development is expected to amplify the severity of financial crises. The impact on financial wealth and on wealth generated by access to credit is indeed stronger in financially developed countries. The influence of the banking crisis on wealth inequality is then strengthened by the financial transmission channels. Finally, the initial level of wealth inequality can also influence the impact of the GFC notably through a potential convergence process.

Our contribution to the literature is twofold. First, we enhance the understanding of the real effects of banking crises. Any impact of the GFC on wealth inequality would suggest that banking crises can have distributional effects and could affect economic incentives. It could therefore affect economic growth through this channel of transmission and may also influence political changes, given the links between inequality and political stability (Alesina and Perotti, 1996). Second, we extend the literature on wealth inequality by investigating one of its potential determinants (e.g., Benhabib et al., 2017). While many studies have identified the causes of income inequality, much less work has been devoted to wealth inequality. We contribute to this strand of literature by bringing evidence about the influence of banking crises. We can thus answer the question whether the GFC has influenced changes in wealth inequality in recent years.

Our results suggest the occurrence of the GFC has not led to changes in wealth inequality. We do not find any significant link between the occurrence of the GFC and the variation in wealth inequality in the following years. We find limited evidence that the severity of the banking crisis affects wealth inequality. We show that the economic characteristics of the country affect the impact of the GFC on the

variation in wealth inequality. The GFC has led to a more pronounced increase of wealth inequality in countries with higher economic and financial development and lower initial wealth inequality.

This study is structured as follows. Section 2 presents the data and methodology. Section 3 displays the results. Section 4 provides concluding remarks.

2. Data and methodology

To conduct our research, we need to collect data on wealth inequality as well as on the occurrence and the intensity of the GFC. We compile annual data on the Gini index of inequality in wealth (%) from the Credit Suisse Global Wealth Report. Our analysis refers to four time periods: 2010–2012, 2010–2014, 2010–2016 and 2010–2018 to investigate the influence of the GFC at different time horizons.² Thus, our dependent variable (*Gini change*) is the difference between the Gini coefficient for the last year of the four periods and its initial value in 2010.

The data on the GFC come from Laeven and Valencia (2020), who provide information on the occurrence and the severity of the crisis for each country. We consider three proxies for the GFC. First, we use the dummy variable *Crisis*, equal to one if the country experienced a financial crisis during 2008–2010, and zero, otherwise. Second, we consider two measures of the severity of the crisis: the output loss in percent of GDP (*Output Loss*) and the fiscal cost in percent of GDP (*Fiscal Cost*).³ We adopt these two variables to assess the severity of the crisis since we investigate the impact of the GFC on the change in wealth inequality, which can be influenced by the magnitude of the banking crisis in macroeconomic terms.

Based on the previous literature on the determinants of inequality (Cihak and Sahay, 2020; Dabla-Norris et al., 2015; Jaumotte et al., 2013), we include a set of control variables to take into account the country characteristics which can influence wealth inequality. We consider GDP growth rate (*GDP growth*), GDP per capita in constant US \$ (*GDP per capita*), unemployment rate (*Unemployment*) and total government final consumption expenditures (*Government exp*). We also include variables which characterize trade and financial openness of the country (*Trade and FDI*), average years of compulsory education (*Education*) and sectoral structure of the economy (*Agriculture and Industry* which measure the number of people employed in the corresponding sectors). All these variables come from the World Development Indicators.

To take into account the country's financial development, we employ the IMF financial development index (*Financial development*). This composite measure proposed by Svirydenka (2016) captures financial sector depth, efficiency and accessibility of financial services to population (both with respect to financial institutions and financial markets). We also use the Political Stability index (*Political stability*) from the Worldwide Governance Indicators to test whether it could have any impact on the crisis-wealth inequality link. Finally, we include regional dummies in the regressions to control for regional fixed effects. We include dummy variables for Africa, Asia, Europe, North America, South America, with Oceania being the omitted variable.

Table 1 presents descriptive statistics for all the variables included in the analysis. In total, our sample covers 143 countries, though the number of observations varies slightly from period to period due to some missing values in the data. The definitions of all variables are provided in the Appendix.

To conduct our research, we estimate cross-country regressions across the four time windows: 2010–2012, 2010–2014, 2010–2016, and 2010–2018. By using the time windows we examine the timing and the duration of the potential impact of the crisis.

Our model for each of the sub-periods can be specified as follows:

$$\begin{aligned} \text{Ginichange} = & \beta_0 + \beta_1 \text{Crisis variable} + \beta_2 \text{Financial development} + \beta_3 \text{Gdp growth} + \beta_4 \text{Gdp per Capita} + \beta_5 \text{Unemployment} \\ & + \beta_6 \text{Government exp} + \beta_7 \text{Political stability} + \beta_8 \text{Trade} + \beta_9 \text{Education} + \beta_{10} \text{Agriculture} + \beta_{11} \text{Industry} \\ & + \beta_{12} \text{FDI} + \text{Region dummies} + \varepsilon \end{aligned} \quad (1)$$

where *Crisis variable* is alternatively *Crisis*, *Fiscal cost*, or *Output loss*; ε is an error term. For all control variables we apply their values as of 2010 to avoid simultaneity bias between the response variable and the regressors.

We estimate equation (1) with robust least squares (RLS), thereby overcoming the drawback of the standard ordinary least squares (OLS) by minimizing the effect of outliers in the dependent variable (by using M-estimator (Huber, 1973)), independent variables (by using S-estimator (Rousseeuw and Yohai, 1984)) or in both (by using MM-estimator, which combines S- and M-techniques). Specifically, the robust least squares method yields more reliable regression coefficient estimates when extreme values are present in the data. Based on the outlier detection diagnostics, where we analyze different influence statistics for the regressors and identify extreme values in the dependent variable, we opt for using the MM-estimator.

² We have also considered the alternative time periods (2010–2013, 2010–2015, 2010–2017) but do not report them for space reasons. The results are similar.

³ *Output Loss* and *Fiscal Cost* borrowed from Laeven and Valencia database on systemic banking crises are calculated as follows: *Output Loss* (in % of real GDP trend) represent the cumulative sum of the differences between actual and real GDP trend over 3 periods ahead starting from the year of the crisis. *Fiscal Cost* is defined as the outlays related to the restructuring of the financial sector and include costs associated with bank recapitalizations but exclude asset purchases and direct liquidity assistance from the treasury.

Table 1
Descriptive statistics.

	Observations	Mean	Std. Dev.	Min.	Max.
Financial development	143	0.34	0.24	0.04	0.95
GDP per capita	143	8.57	1.52	5.46	11.56
GDP growth	143	4.32	3.83	−8.92	19.59
Government exp	143	14.42	6.99	0.00	39.91
Political Stability	143	47.63	27.29	0.47	99.05
Unemployment	143	7.90	5.80	0.00	27.31
Trade	143	82.16	53.13	0.00	369.69
Education	143	8.59	3.18	0.00	15.00
Agriculture	143	27.18	24.20	0.00	88.22
Industry	143	19.52	9.03	0.00	56.33
FDI	143	8.49	23.71	−15.75	205.92
Crisis	143	0.15	0.36	0.00	1.00
Fiscal Cost	143	1.45	5.42	0.00	37.63
Output Loss	143	4.96	15.79	0.00	107.72
Gini change 2010–2012	143	0.47	6.90	−21.00	25.20
Gini change 2010–2014	143	1.23	7.51	−24.80	27.90
Gini change 2010–2016	143	5.74	8.21	−20.50	31.70
Gini change 2010–2018	143	3.05	8.77	−20.40	31.50

The table displays the descriptive statistics of the variables for each period used in the estimations. Definitions of all variables are presented in the Appendix.

Table 2
Main estimations.

	<i>Dependent variable = Gini change</i>			
	2010–2012	2010–2014	2010–2016	2010–2018
Crisis	−1.86 (1.43)	−2.39 (1.57)	−1.89 (2.19)	0.94 (1.90)
Financial development	12.21*** (3.59)	7.75* (3.96)	3.42 (5.51)	7.08 (4.79)
GDP per capita	0.53 (0.80)	1.71* (0.88)	1.29 (1.23)	0.95 (1.07)
GDP growth	−0.16 (0.12)	−0.35** (0.13)	−0.22 (0.18)	−0.63*** (0.16)
Government exp	−0.14* (0.07)	−0.15* (0.08)	−0.06 (0.11)	−0.33*** (0.10)
Political stability	0.01 (0.02)	0.03 (0.02)	0.02 (0.03)	0.02 (0.03)
Unemployment	−0.07 (0.08)	−0.12 (0.08)	−0.17 (0.12)	−0.08 (0.10)
Trade	−0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)
Education	0.23 (0.16)	0.06 (0.17)	0.00 (0.24)	−0.02 (0.21)
Agriculture	0.04 (0.05)	0.07 (0.05)	0.07 (0.07)	0.01 (0.06)
Industry	−0.14** (0.06)	0.02 (0.07)	−0.24** (0.10)	−0.12 (0.09)
FDI	0.00 (0.02)	0.00 (0.02)	0.00 (0.03)	0.00 (0.03)
Constant	−4.45 (7.68)	−18.05** (8.46)	−8.15 (11.80)	−4.87 (10.24)
R ²	0.15	0.21	0.16	0.21
N	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

3. Results

3.1. Main estimations

We first report the results for the occurrence of the GFC in Table 2. As the dependent variable, we consider successively the variation in wealth inequality on four different periods (2010–2012, 2010–2014, 2010–2016, 2010–2018) so that we can examine the timing and the length of the potential impact of the GFC.

We observe that *Crisis* is not significant in all estimations, meaning that the occurrence of the financial crisis is not associated with any change in wealth inequality. Therefore these estimations do not provide support for the view that the occurrence of the GFC has led either to an increase or to a decrease of wealth inequality.

We then turn to the results for the severity of the banking crisis by considering alternatively *Fiscal cost* and *Output loss* as the key independent variable in Tables 3 and 4.

First, *Fiscal cost* is positive in estimations explaining change in wealth inequality for all periods, but only significant for two periods (2010–2012, 2010–2018). This result provides some limited evidence that a more severe banking crisis in terms of fiscal cost has led to an increase of wealth inequality. Second, *Output loss* is negative in all estimations, being significant for three periods (the exception being 2010–2014). Hence the severity of the banking crisis when measured by output loss tends to be associated with a reduction in wealth inequality.

These results give some support to the view that the severity of the banking crisis matters for wealth inequality. Interestingly, the indicator of the severity influences the sign of the impact on wealth inequality. Our findings suggest that a more severe banking crisis in terms of fiscal cost increases wealth inequality while a more severe banking crisis in terms of output loss reduces wealth inequality.

How can we reconcile both findings? The positive impact of the severity in terms of fiscal cost on wealth inequality may arise from the fact that higher fiscal cost contributes to reduce redistribution toward the poorest members of the population, because of the reduction of budgetary resources. They are consequently forced to reduce their wealth to maintain their standard of living.

The negative impact of the severity in terms of output loss on wealth inequality can come from the fact that a banking crisis associated with greater output loss affects in particular the wealth of the richest individuals of the society. The poorest individuals have low or no wealth, so a banking crisis leading to a fall of the output does not affect much their wealth. At the same time, such crisis can deteriorate the wealth of the richest individuals by reducing the value of their financial assets among others.

The coefficients of the control variables are significant in few cases. *GDP growth* is negative in all specifications, being significant in most cases. This result suggests that higher economic growth contributes to reduce wealth inequality. It can result from the fact that a higher growth helps countries to establish redistribution, reducing inequalities within the society. *Financial development* is positive in all specifications, but significant only in half cases. It supports the view that greater financial development has been associated with higher increase in wealth inequality. This conclusion accords with the finding from Chiu and Lee (2019) that greater financial development can generate greater inequality. A greater financial development can benefit more to the wealthiest individuals because imperfections on the credit markets provide them a better access to credit and because they can exploit more financial opportunities on more developed financial markets. Finally, *Government exp* is negative, being significant in most cases. It suggests that a greater ratio of government

Table 3
Severity of the banking crisis: the fiscal cost.

	Dependent variable = Gini change			
	2010–2012	2010–2014	2010–2016	2010–2018
Fiscal Cost	0.13* (0.08)	0.02 (0.09)	0.12 (0.12)	0.20* (0.11)
Financial development	12.61*** (3.25)	5.64 (3.86)	2.48 (5.27)	7.67* (4.53)
GDP per capita	−0.10 (0.75)	1.56 (0.89)	0.86 (1.21)	0.73 (1.04)
GDP growth	−0.09 (0.11)	−0.31** (0.13)	−0.15 (0.18)	−0.57*** (0.15)
Government exp	−0.19*** (0.07)	−0.16** (0.08)	−0.12 (0.11)	−0.36*** (0.09)
Political stability	0.01 (0.02)	0.03 (0.02)	0.02 (0.03)	0.02 (0.03)
Unemployment	−0.01 (0.07)	−0.10 (0.08)	−0.14 (0.12)	−0.04 (0.10)
Trade	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)
Education	0.17 (0.15)	−0.01 (0.17)	−0.07 (0.24)	−0.04 (0.20)
Agriculture	0.04 (0.04)	0.06 (0.05)	0.05 (0.07)	0.01 (0.06)
Industry	−0.07 (0.06)	0.04 (0.07)	−0.22** (0.10)	−0.12 (0.08)
FDI	−0.01 (0.02)	−0.01 (0.02)	0.00 (0.03)	−0.01 (0.02)
Constant	−0.13 (7.15)	−16.51* (8.50)	−0.99 (11.60)	−2.72 (9.97)
R ²	0.15	0.21	0.16	0.21
N	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

Table 4
Severity of the banking crisis: the output loss.

Dependent variable = Gini change				
	2010–2012	2010–2014	2010–2016	2010–2018
Output Loss	−0.05* (0.03)	−0.04 (0.03)	−0.08* (0.04)	0.07* (0.04)
Financial development	11.83*** (3.45)	6.95* (3.83)	1.65 (5.29)	6.36 (4.57)
GDP per capita	0.51 (0.78)	1.70* (0.87)	1.21 (1.20)	0.86 (1.03)
GDP growth	−0.18 (0.12)	−0.35** (0.13)	−0.26 (0.18)	−0.57*** (0.15)
Government exp	−0.14** (0.07)	−0.15* (0.08)	−0.05 (0.11)	−0.34*** (0.09)
Political stability	0.01 (0.02)	0.02 (0.02)	0.03 (0.03)	0.02 (0.03)
Unemployment	−0.06 (0.08)	−0.11 (0.08)	−0.18 (0.12)	−0.06 (0.10)
Trade	−0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)
Education	0.22 (0.15)	0.02 (0.17)	0.02 (0.23)	−0.03 (0.20)
Agriculture	0.04 (0.04)	0.07 (0.05)	0.05 (0.07)	0.01 (0.06)
Industry	−0.12* (0.06)	0.02 (0.07)	−0.24** (0.10)	−0.13 (0.08)
FDI	0.00 (0.02)	−0.01 (0.02)	−0.01 (0.03)	0.00 (0.02)
Constant	−3.98 (7.49)	−17.34** (8.31)	−6.81 (11.47)	−3.72 (9.91)
R ²	0.15	0.21	0.17	0.21
N	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

expenditures to GDP reduces the change in wealth inequality, which accords with the role of government expenditures in the redistribution. Higher government expenditures can notably be associated with higher taxes on wealth to be financed.

To sum it up, our main estimations uncover two key findings. First, the mere occurrence of the GFC does not exert an impact on wealth inequality. Second, a more severe GFC in terms of fiscal cost tends to increase wealth inequality, while a more severe GFC in terms of output loss reduces wealth inequality. The influence of the GFC on wealth inequality appears therefore ambiguous.

3.2. Interactions

We can, however, question whether these results obtained in the main estimations depend on the economic framework of the country. As discussed above, the transmission channels explaining the effect of the GFC on wealth inequality can differ across countries. Thus we consider three country characteristics which can affect the impact of the GFC on the change in wealth inequality: the level of economic development, the level of financial development, and the initial level of wealth inequality. We check whether the impact of crisis variables is affected by these characteristics by adding an interaction term between each characteristic and crisis variables. The significance of the interaction term would suggest that the characteristic influences the impact of the GFC on wealth inequality.

We first consider economic development to examine whether the GFC has contributed in a different way on wealth inequality for developed, emerging, and developing countries. Economic development affects the impact of the GFC through the real economy channels. More developed economies have on average greater income redistribution, which means that they can absorb more real effects of financial crises. It can therefore occur that the GFC had a lower impact on wealth inequality in more developed countries. To this end, we add the interaction term between *GDP per capita* and the crisis variable in estimations. Table 5 displays these results.

We observe that the interaction term with *GDP per capita* is significantly positive in all estimations including one indicator of the severity of the banking crisis, but not significant when considering the occurrence of the crisis. It supports the view that a more severe GFC has enhanced more wealth inequality in developed countries. This finding is of major interest since it suggests that the GFC did not have the same effect for all countries in terms of wealth inequality.

We then turn to the influence of financial development on the impact of the GFC on wealth inequality. A banking crisis can affect inequality through financial transmission channels: it can lower asset prices and curb access to credit. The influence of financial development can have ambiguous effects on wealth inequality. On the one hand, it can reduce wealth inequality since the fall of financial asset prices will particularly hamper the wealth of the richest individuals. On the other hand, it can increase wealth inequality if it had a greater impact on real estate than on other assets, since the richest individuals own a lower share of their assets in real estate

Table 5
Interactions with economic development.

	Crisis				Fiscal cost				Output loss			
	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-
	2012	2014	2016	2018	2012	2014	2016	2018	2012	2014	2016	2018
Crisis	15.29*	6.89	−5.05	1.28								
	(8.45)	(9.28)	(12.94)	(11.25)								
Crisis × GDP per capita	−1.88**	−1.01	0.32	−0.04								
	(0.88)	(0.97)	(1.35)	1.18)								
Fiscal Cost					−4.69***	−4.96***	−5.94***	−4.69***				
					(1.27)	(1.35)	(1.81)	(1.66)				
Fiscal Cost × GDP per capita					0.45***	0.47***	0.57***	0.46***				
					(0.12)	(0.13)	(0.17)	(0.16)				
Output Loss									−1.51***	−1.31***	−1.79***	−1.26***
									(0.32)	(0.35)	(0.47)	(0.44)
Output Loss × GDP per capita									0.15***	0.13***	0.18***	0.13***
									(0.03)	(0.03)	(0.05)	(0.04)
R-squared	0.16	0.22	0.16	0.21	0.14	0.23	0.20	0.23	0.16	0.24	0.22	0.22
N	143	143	143	143	143	143	143	143	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. All control variables are included. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

than the rest of the population. It can also aggravate wealth inequality by restricting access to credit for the poorest individuals, reducing their possibilities to launch business notably. We expect that greater financial development fosters the severity of financial crises as pointed out by Bazillier and Héricourt (2017), meaning that the positive or negative effects of the GFC on wealth inequality should be amplified in more financially developed countries.

Table 6 displays the results with interactions with *Financial development*. We find that the interaction term of *Financial development* with both variables for the severity of the GFC, *Fiscal cost* and *Output loss*, is significantly positive in most estimations while the interaction term with *Crisis* is not significant. Thus we observe that a more severe banking crisis has led to a greater increase in wealth inequality in countries with higher financial development.

The initial level of wealth inequality can also influence the impact of the GFC on the change in wealth inequality. On the one hand, we can have a convergence process in the sense that countries with higher initial wealth inequality would have lower impact of the GFC on the change in wealth inequality. We would then observe a negative coefficient for the interaction term between the initial level of wealth inequality and crisis variables. On the other hand, we might observe that more unequal countries have undergone greater increase in wealth inequality with the GFC because of the absence of safeguards in these countries to limit inequality. In that case a positive coefficient for the interaction term between the initial level of wealth inequality and crisis variables would be observed.

We then perform estimations including the initial level of wealth inequality (*Gini 2010*) and its interaction with crisis variables. They are reported in Table 7. We find that the interaction term is significantly negative in all estimations. Therefore, we show that the GFC has increased more wealth inequality in countries in which the initial level of wealth inequality was lower. It accords with the convergence hypothesis.

In a nutshell, we find that the impact of the GFC on wealth inequality is influenced by country characteristics. It has increased more wealth inequality in countries with higher economic development and financial development as well as lower initial wealth inequality.

These results are of major importance. They provide strong support to the view that the impact of the GFC on wealth inequality has been conditional on the economic framework. The economic characteristics of a country affect the magnitude of the impact of a banking crisis on wealth inequality. In the context of the GFC, these results suggest that developed countries combining high economic and financial development but also lower wealth inequality have faced a higher increase in wealth inequality than developing countries.

3.3. Robustness checks

We examine the robustness of our findings in several ways. In all robustness tests, we consider the specification with all control variables unless otherwise indicated.

First, we use an alternative measure for the dependent variable. We consider the average Gini change per year rather than the difference over the period. Second, we use an alternative set of control variables. We skip the variables related to economic structure (*Trade, FDI, Agriculture, Industry*) since our results can be influenced by the selection of control variables. Third, we use an alternative estimator than robust least squares: we redo the estimations with the standard OLS. Fourth, we account for the potential endogeneity of the crisis variables with the use of a two-stage least squares estimator. All these estimations are displayed in Table 8.

First, we find that *Crisis* is not significant in all robustness checks and all periods with one exception. These findings confirm our result that the occurrence of the financial crisis is not associated with any change in wealth inequality.

Second, we tend to find no significant impact for *Fiscal Cost*. We only observe a positive coefficient for *Fiscal Cost* which is significant in the robustness check with the alternative set of control variables: it is then significant for two periods. We found that this coefficient was significant in two of the four windows in the main estimations. Hence these results tend to support the view that the severity of the

Table 6
Interactions with financial development.

	<i>Crisis</i>				<i>Fiscal cost</i>				<i>Output loss</i>			
	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-
	2012	2014	2016	2018	2012	2014	2016	2018	2012	2014	2016	2018
<i>Crisis</i>	4.30 (2.78)	1.03 (3.13)	-5.27 (4.28)	1.83 (3.72)								
<i>Crisis</i> × <i>Financial Development</i>	-14.08 (4.72)	-7.67 (5.32)	6.00 (7.28)	-1.24 (6.33)								
<i>Fiscal Cost</i>					-0.46 (0.29)	-0.77 (0.34)	-1.00 (0.45)	-0.62 (0.41)				
<i>Fiscal cost</i> × <i>Financial Development</i>					0.92** (0.46)	1.26** (0.54)	1.81** (0.72)	1.31** (0.66)				
<i>Output Loss</i>									-0.10 (0.07)	-0.21 (0.08)	-0.29 (0.11)	-0.09 (0.10)
<i>Output Loss</i> × <i>Financial Development</i>									0.18 (0.12)	0.33** (0.14)	0.54*** (0.18)	0.26 (0.17)
R-squared	0.16	0.22	0.16	0.21	0.16	0.21	0.18	0.22	0.15	0.22	0.19	0.22
N	143	143	143	143	143	143	143	143	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. All control variables are included. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

Table 7

Interactions with the initial level of wealth inequality.

	Crisis				Fiscal cost				Output loss			
	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-	2010-
	2012	2014	2016	2018	2012	2014	2016	2018	2012	2014	2016	2018
Gini_2010	−0.42*** (0.09)	−0.52*** (0.07)	−0.64*** (0.12)	−0.70*** (0.12)	−0.45*** (0.07)	−0.56*** (0.06)	−0.63*** (0.10)	−0.63*** (0.10)	−0.44*** (0.08)	−0.53*** (0.07)	−0.65*** (0.11)	−0.69*** (0.10)
Crisis	15.81 (9.78)	9.77 (8.26)	9.01 (13.78)	0.35 (13.39)								
Crisis×Gini 2010	−0.28** (0.14)	−0.20* (0.12)	−0.15 (0.20)	−0.01 (0.19)								
Fiscal Cost					2.65*** (0.88)	1.89** (0.77)	2.10* (1.25)	1.79 (1.21)				
Fiscal Cost × Gini 2010					−0.04*** (0.01)	−0.03** (0.01)	−0.03* (0.02)	−0.03 (0.02)				
Output Loss									0.59** (0.23)	0.46** (0.20)	0.34 (0.33)	0.15 (0.31)
Output Loss×Gini 2010									−0.01*** (0.00)	−0.01** (0.00)	−0.01 (0.00)	0.00 (0.00)
R-squared	0.30	0.37	0.33	0.00	0.30	0.36	0.33	0.36	0.29	0.37	0.33	0.35
N	143	143	143	143	143	143	143	143	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. All control variables are included. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

banking crisis in terms of fiscal cost does not affect wealth inequality.

Third, we overall find that *Output Loss* is not significant. We observe that the coefficient of *Output Loss* is not significant for three or four periods in all four robustness checks. As a consequence, these findings suggest that the severity of the banking crisis in terms of output loss would be overall without impact on wealth inequality.

To sum it up, our main findings are partly corroborated by the robustness checks. These additional tests confirm the key result of no impact of the occurrence of the financial crisis on the change in wealth inequality. However they qualify our findings on the impact of a more severe financial crisis on the variation in wealth inequality.

The analysis of the nonlinear relationship for *Fiscal Cost* and *Output Loss* helps understanding the lack of robustness of their relation with the change in wealth inequality. We include the squared value for *Fiscal Cost* (*Output Loss*) in the estimations to consider possible nonlinearity in the relation between *Fiscal Cost* (*Output Loss*) and the change in wealth inequality. The estimations are reported in Table 9.

For *Output Loss*, the coefficients of the linear term are significantly negative while the coefficients for the squared term are significantly positive for all periods. These findings clearly support the finding of a nonlinear relation between the severity of the banking crisis in terms of output loss and the occurrence of the financial crisis.

In order to evaluate the relation between the severity of the banking crisis in terms of output loss and the occurrence of the financial crisis between market power and the occurrence of bank failure, we calculate the minimum of each quadratic function and compare it with the distribution of data. The minimum respectively equals to 48.3, 51.7, 45, and 38.3 for the periods. Since the maximum value for *Output Loss* is 107.72 while the mean value is 4.96, all values are in the range of the values for the sample and above the mean. Thus, the analysis of the nonlinear relation suggests that the severity of the banking crisis in terms of output loss reduces the change in wealth inequality for most banking crises, but it increases the change in wealth inequality if the severity of the banking crisis in terms of output

Table 8
Robustness checks.

	Crisis				Fiscal cost				Output loss			
	2010-2012	2010-2014	2010-2016	2010-2018	2010-2012	2010-2014	2010-2016	2010-2018	2010-2012	2010-2014	2010-2016	2010-2018
New dependent variable: Average Gini Change												
Crisis	-0.07 (0.26)	-0.38 (0.36)	0.13 (0.33)	0.65*** (0.23)								
Fiscal Cost					0.00 (0.02)	-0.03 (0.02)	0.02 (0.02)	0.02 (0.01)				
Output Loss									0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.01** (0.01)
R-squared	0.13	0.14	0.15	0.19	0.13	0.15	0.15	0.18	0.13	0.15	0.16	0.19
N	143	143	143	143	143	143	143	143	143	143	143	143
Alternative set of controls												
Crisis	-0.09 (1.38)	-2.05 (1.53)	0.69 (2.19)	0.83 (1.85)								
Fiscal Cost					0.18** (0.08)	0.04 (0.09)	0.21* (0.12)	0.23** (0.10)				
Output Loss									-0.01 (0.03)	-0.03 (0.03)	0.01 (0.05)	0.08** (0.04)
R-squared	0.11	0.20	0.10	0.20	0.13	0.20	0.11	0.20	0.11	0.20	0.10	0.20
N	143	143	143	143	143	143	143	143	143	143	143	143
Alternative estimator: OLS estimator												
Crisis	-3.35 (2.11)	-2.34 (2.25)	-0.97 (2.56)	-1.40 (2.58)								
Fiscal Cost					0.06 (0.12)	0.01 (0.13)	0.12 (0.14)	0.13 (0.15)				
Output								-0.05	-0.04 (0.04)	0.00 (0.05)	0.02 (0.05)	(0.05)
R ²	0.17	0.20	0.13	0.23	0.15	0.19	0.14	0.23	0.16	0.20	0.13	0.23
N	143	143	143	143	143	143	143	143	143	143	143	143
Accounting for potential endogeneity (2SLS estimations)												
Crisis	7.63 (47.84)	4.1 (47.68)	19.38 (41.59)	1.64 (53.35)								
Fiscal Cost					1.9 (18.35)	1.02 (14.08)	2.76 (10.74)	0.41 (13.34)				
Output Loss								0.08	0.04 (0.47)	4.24 (0.48)	0.02 (13.46)	(0.55)
N	142	142	105	142	142	142	105	142	142	142	105	142

The table displays RLS estimations unless otherwise indicated. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column, unless otherwise indicated. All control variables are included unless otherwise indicated. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

Table 9
Testing nonlinear relationship.

Dependent variable = Gini change				
	2010–2012	2010–2014	2010–2016	2010–2018
Fiscal Cost	–0.36 (0.24)	–0.46* (0.28)	–0.6 (0.39)	–0.25 (0.34)
Fiscal Cost ²	0.01* (0.01)	0.01* (0.01)	0.02* (0.01)	0.01 (0.01)
R ²	0.16	0.22	0.17	0.21
N	143	143	143	143
Output Loss	–0.29*** (0.08)	–0.31*** (0.08)	–0.27** (0.11)	–0.23** (0.1)
Output Loss ²	0.003*** (0)	0.003*** (0)	0.003** (0)	0.003*** (0)
R ²	0.18	0.23	0.18	0.23
N	143	143	143	143

The table displays RLS estimations. The dependent variable is *Gini change*, the variation in Gini index over the period mentioned at the top of the column. All control variables are included. Regional dummies are included. *, **, *** denote an estimate significantly different from 0 at the 10%, 5%, or 1% level. Standard errors are in parentheses. Definitions of all variables are presented in the Appendix.

reaches high levels.

For *Fiscal Cost*, the findings do not overall support the existence of a nonlinear relation. For the periods 2010–2012 and 2010–2016, we observe that the coefficient of the linear term is not significant while the coefficient of the squared term is significantly positive. For the period 2010–2014, the coefficient of the linear term is significantly negative while the coefficient of the squared term is significantly positive. Finally, the coefficients of the linear term and of the squared term are both not significant for the period 2010–2018. We cannot thus obtain a clear conclusion in favor of a nonlinear relation.

4. Conclusion

This paper examines the impact of the GFC on wealth inequality. It represents the first empirical investigation on the effects of banking crises on wealth inequality.

We obtain several findings. First, we find no significant relationship between the occurrence of the GFC and the variation in wealth inequality in the following years. This result is confirmed by all robustness checks. Second, we show some limited evidence that the severity of the banking crisis affects the change in wealth inequality. Our main estimations provide some evidence that a more severe crisis in terms of fiscal cost would increase wealth inequality while a more severe crisis in terms of output loss would have the opposite effect on wealth inequality. These results are nevertheless not confirmed by the robustness checks. We, however, provide support for a nonlinear relation between the severity of the financial crisis in terms of output loss and the change in wealth inequality: a more severe financial crisis would reduce wealth inequality as long as the output loss does not reach very high values above which the impact would be reversed.

Third, we observe that the country characteristics influence the impact of the GFC on the change in wealth inequality. Higher levels of economic and financial development as well as a lower initial level of wealth inequality lead to a greater effect of the GFC to increase wealth inequality. This finding is of major interest. It supports the view that the impact of the GFC on wealth inequality has been conditional on the economic framework.

Overall, our work contributes to a better understanding of the real effects of banking crises. These crises can have distributional effects and as such can influence economic incentives. However, these effects are not the same for all countries. We show that the economic framework of the country shapes the influence of banking crises on wealth inequality. In terms of economic implications, we support the view that banking crises increase more wealth inequality in developed countries. As a consequence, authorities should particularly reduce the occurrence of such events in these countries, and should be more cautious about the consequences of banking crises on wealth inequality in these countries through stronger redistribution.

Further efforts are, however, needed in this new field of research. They can take place through various angles. First, new research can focus on a larger number of banking crises to check any peculiarity of the GFC. However, the availability of data on wealth inequality for a long period at a cross-country level represents a major obstacle to perform a similar investigation than ours for a large set of banking crises. Improvements in databases may allow such investigation in the near future. Second, it can consider alternative econometric models. The use of panel data associated with a large set of banking crises can contribute to such extension. Third, it can investigate deeper the transmission channels explaining the relation between banking crises and wealth inequality. Micro-level data can facilitate this contribution. Fourth, the effect of other types of financial crises like currency crises, sovereign debt crises, or stock market crises, would be of interest to investigate. It can help by providing a better understanding and comparison of the different types of financial crises on wealth inequality, contributing to the identification of their real effects. Thus, our work opens avenues for further research.

Appendix

Table 1A
Definitions and sources of variables

Variable name	Definition	Source
Gini change	Difference in the Gini index in household wealth (%) between the two endpoints for the periods 2010–2012, 2010–2014, 2010–2016, 2010–2018	Credit Suisse Global Wealth Databook 2018
Crisis	Dummy variable, equal to one if the country experienced a financial crisis during 2008–2010, and zero, otherwise	Laeven and Valencia (2018)
Fiscal cost	GFC fiscal cost, net (% of GDP)	Laeven and Valencia (2018)
Output loss	GFC output loss (% of GDP)	Laeven and Valencia (2018)
Financial development	Financial Development Index. It summarizes how developed financial institutions and markets are in terms of their depth (size and liquidity), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues and the level of activity of capital markets)	Financial Development Index Database, IMF
GDP per capita	Gross domestic product in current US \$ divided by midyear population	World Development Indicators
GDP growth	GDP growth, annual %. Annual percentage growth rate of GDP at market prices based on constant local currency	World Development Indicators
Government exp	General government final consumption expenditure (% of GDP)	World Development Indicators
Political stability	Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism	Worldwide Governance Indicators
Unemployment	Unemployment total, % of total labor force	World Development Indicators
Trade	Sum of exports and imports to GDP (% of GDP)	World Development Indicators
Education	Compulsory education, duration (years)	World Development Indicators
Agriculture	Agriculture employment share (% of total employment)	World Development Indicators
Industry	Industry employment share (% of total employment)	World Development Indicators
FDI	Foreign direct investment, net inflows (% of GDP)	World Development Indicators

Table 2A
List of countries with indication of banking crises

Country	Crisis	Country	Crisis	Country	Crisis
Afghanistan	0	Germany	1	Oman	0
Albania	0	Ghana	0	Pakistan	0
Algeria	0	Greece	1	Panama	0
Angola	0	Grenada	0	Papua New Guinea	0
Antigua and Barbuda	0	Guinea	0	Paraguay	0
Argentina	0	Guinea-Bissau	0	Peru	0
Armenia	0	Guyana	0	Philippines	0
Aruba	0	Haiti	0	Poland	0
Australia	0	Honduras	0	Portugal	1
Austria	1	Hong Kong	0	Qatar	0
Azerbaijan	0	Hungary	1	Romania	0
Bahamas	0	Iceland	1	Russia	0
Bahrain	0	India	0	Rwanda	1
Bangladesh	0	Indonesia	0	Samoa	0
Barbados	0	Iran	0	Sao Tome and Principe	0
Belarus	0	Iraq	0	Saudi Arabia	0
Belgium	1	Ireland	1	Senegal	0
Belize	0	Israel	0	Serbia	0
Benin	0	Italy	1	Seychelles	0
Bolivia	0	Jamaica	0	Sierra Leone	0
Bosnia and Herzegovina	0	Japan	0	Singapore	0
Botswana	0	Jordan	0	Slovakia	0
Brazil	0	Kazakhstan	1	Slovenia	0
Brunei	0	Kenya	0	Solomon Islands	1
Bulgaria	0	Korea	0	South Africa	0
Burkina Faso	0	Kuwait	0	Spain	1
Burundi	0	Kyrgyzstan	0	Sri Lanka	0
Cambodia	0	Laos	0	St. Lucia	0
Cameroon	0	Latvia	1	St. Vincent and the Grenadines	0
Canada	0	Lebanon	0	Sudan	0
Central African Republic	0	Lesotho	0	Suriname	0
Chad	0	Liberia	0	Swaziland	0
Chile	0	Libya	0	Sweden	1
China	0	Lithuania	0	Switzerland	1
Colombia	0	Luxembourg	1	Syria	0
Comoros	0	Macedonia	0	Taiwan	0
Congo, Dem. Rep.	0	Madagascar	0	Tajikistan	0
Congo, Rep.	0	Malawi	0	Tanzania	0

(continued on next page)

Table 2A (continued)

Country	Crisis	Country	Crisis	Country	Crisis
Costa Rica	0	Malaysia	0	Thailand	0
Cote d'Ivoire	0	Maldives	0	Timor-Leste	0
Croatia	0	Mali	0	Togo	0
Cyprus	0	Malta	0	Tonga	0
Czech Republic	0	Mauritania	0	Trinidad and Tobago	0
Denmark	1	Mauritius	0	Tunisia	0
Djibouti	0	Mexico	0	Turkey	0
Dominica	0	Mongolia	1	Turkmenistan	0
Ecuador	0	Montenegro	0	Uganda	0
Egypt	0	Morocco	0	Ukraine	1
El Salvador	0	Mozambique	0	United Arab Emirates	0
Equatorial Guinea	0	Myanmar	0	United Kingdom	1
Eritrea	0	Namibia	0	United States	1
Estonia	0	Nepal	0	Uruguay	0
Ethiopia	0	Netherlands	1	Vanuatu	0
Fiji	0	New Zealand	0	Vietnam	0
Finland	0	Nicaragua	0	Yemen	0
France	1	Niger	0	Zambia	0
Gabon	0	Nigeria	1	Zimbabwe	0
Gambia	0	Norway	0		
Georgia	0				

This table reports the list of all countries in the sample. Crisis is the dummy variable equal to one if the country experienced a financial crisis during 2008–2010, and zero otherwise.

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