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Income Inequality and the Great Recession:

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Abstract

Income inequality came to the fore with the recent financial crisis, when many authors pointed at it as the main cause of the crisis. This paper aims to contribute to the understanding of the relationship between income inequality and the recent global financial crisis. It assesses whether inequality before the crisis is related to the severity of the crisis. Then, it analyzes the extent to which crisis severity affected the subsequent inequality dynamics. The analysis is conducted on a sample of 146 countries, being in that way the most comprehensive study on these issues. It puts a particular emphasis on the differences between advanced and developing economies. Results suggest that income inequality before the crisis potentially contributed to a severer output drops during the crisis of 2007-2008. The effect of the overall population inequality (Gini index) has been found severer than the one of the top 1% earners' income share. The latter effect is found particularly stronger in developing economies. Then, crisis severity is found important only for the increase of the income share of top 1% earners in developing economies after the crisis. Moreover, those of them who went through a severer crisis, were followed with faster accumulation of the income in the top 1%.

Keywords: inequality; crisis severity; advanced economies; developing economies

JEL classification: D63

1. Introduction

Many have pointed at the rising inequality as the fundamental cause of the Global Financial Crisis of 2007-2008: Stiglitz (2009), Milanovic (2009), Wade (2009), Fitoussi and Saraceno (2010), Rajan (2010), IMF-ILO (2010), Kumhof and Rancière (2015), Kumhof et al. (2012), Galbraith (2012), Palley (2012), Stockhammer (2015). While there are some differences in the elaborations, the main idea is that the shift of income towards the rich and the fall of the middle class in the US, created political pressures which were accommodated by easier credit. This created a credit boom, particularly among the lower and middle classes, and eventually led to a financial crisis in the US, which spread to the rest of the world. Kumhof et al. (2012), building on the ideas in Kumhof and Rancière (2015), developed an open-economy dynamic stochastic general equilibrium model in which this happens and argue that rising inequality leads to worsening of savings-investment balances, as the consumption of the lower and middle classes is financed through the borrowing from the rich and foreign lenders.

The empirical front for investigating the role of inequality for the emergence of the Global Financial Crisis has been rising. Kumhof et al. (2012) confirm their hypothesis from a panel regression for 18 OECD countries for the period 1968-2008. However, other empirical works started to question this finding. For instance, Bordo and Meissner (2012) run a panel regression of 14 advanced economies for a longer period (1920-2008) and conclude that while financial crises typically follow a period of credit boom, inequality only seldom increases under credit expansion. In the same line, Atkinson and Morelli (2010) rely on a cross-country empirical analysis, to conclude that: “[o]utside the US, the history of systemic banking crises in different countries around the world does not suggest that either rising or high inequality has been adduced as a significant causal factor.” (p.66). Therefore, there is no a clear-cut that inequality resulting from a credit-financed boom, led to the financial crisis. For survey of the theoretical and empirical literature on this issue, refer to van Treeck (2014).

Several studies later discussed changes in income inequality after the Global Financial Crisis. Piketty and Saez (2013) discuss trends in the top percentile/decile share in income in several developed countries. They find that the decline in inequality of 2008 and 2009 was reversed in 2010 and argue that the long-run rising trend of inequality is unlikely to change in the future, unless significant policy reforms are undertaken. The volume edited by Jenkins et al. (2013) provides a detailed and thorough analysis of how income distribution changed with the crisis in 21 OECD countries. The main finding is that it changed a little between 2007 and 2009, due to the government support through the tax and benefit system, but that it is likely to change in the following years towards greater inequality, due to the fiscal consolidation measures. Agnello and Sousa (2012) and Ball et al. (2013) focus explicitly on the effects of the fiscal consolidation, arguing that it is likely to increase inequality in the developed countries.

Finally, some recent studies proposed policy measures to prevent rising inequality. Piketty (2014) recommends global and progressive tax on wealth and highly progressive marginal taxes on income. IMF (2014) proposes a set of fiscal measures, including greater use of taxes on property and energy, progressive income taxes, conditional cash transfers, better targeted social assistance programs and improved access to education and health services. Atkinson (2015) proposes 15 measures, including tax reform, public works, introducing living wage and establishing a public investment authority. Stiglitz (2015) gives eight proposals on how to rewrite the rules of the American economy, including increasing competition, reforming the financial system, increasing labor rights and reforming the tax and transfers system.

The considerations about how income inequality may have led to the Global Financial Crisis of 2007-2008, as well how inequality developed after the crisis, brought the topic to the forefront of economic discussions. The aim of this study is to analyze the relationship between income inequality and the Global Financial Crisis of 2007-2008. The analysis is conducted on a sample of 146 countries (i.e. all the countries on which data are available), being in that way the most comprehensive study on the issue in the literature in general.

While the issues that this paper aims to address – the role of the rising inequality for the severity of the recent financial crisis and the developments in inequality after the crisis – have not been neglected in the literature, there are several gaps in the existing corpus of knowledge. To begin with, there are no studies on the role of inequality for the severity of crises. In other words, it is hard to argue that the recent financial crisis spread from the US to the rest of the world because of income inequality; still, income inequality may explain why some countries suffered more during the crisis. Then, whereas several studies have discussed developments in inequality after the recent crisis, they almost exclusively focus on developed countries, leaving developing countries aside. Finally, existing literature on developments in inequality after the crisis has been mostly descriptive in nature, which may be understandable, given the low number of countries they analyzed but certainly warrants a space for more rigorous econometric assessment. This study fills these gaps.

The rest of the paper is organized as follows. Section 2 offers a brief overview stylized facts about the investigated relationships. Section 3 presents the methodology and the data used. Section 4 presents the results. Section 5 concludes.

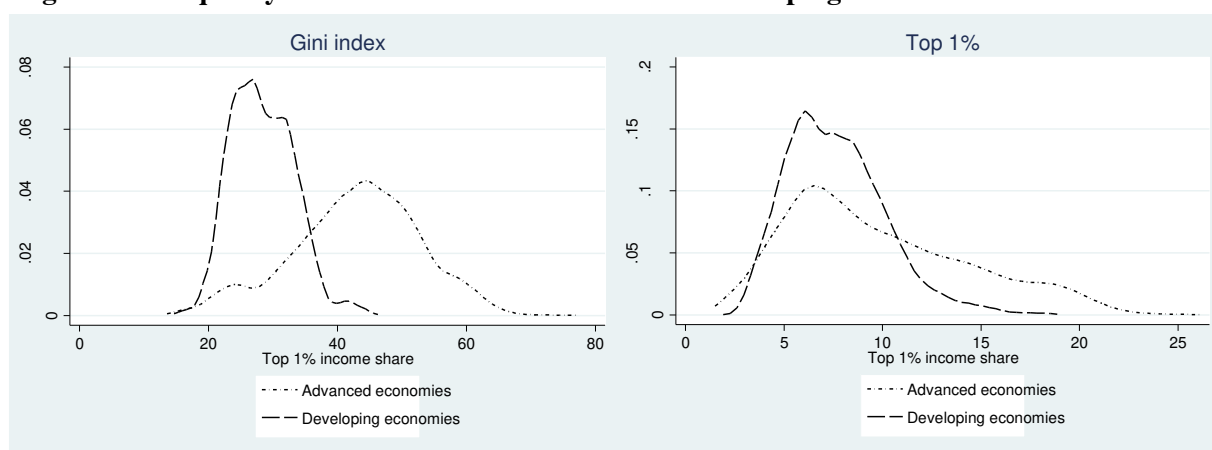
2. Stylized facts

Before we embark on a more rigorous econometric analysis, we provide some stylized facts about inequality and its potential correlation with or contribution to the severity of the Global Crisis of 2007-2008. We have on disposal a sample of 146 countries, which is sufficient to represent the globe. The average Gini index – the most widespread measure of inequality – globally, before the crisis, has been

38.2%, while the average income share of the top 1% earners has been 9.1%. However, expectedly, there is pronounced heterogeneity globally, likely associated with the type of the capitalist system applied, but also to the level of development. We are particularly interested in the second aspect. **Figure 1** presents the distribution of the two measures and detects the areas of concern. First, there is clear difference in the levels of the distribution of the Gini index (left): developed countries did have indisputably higher levels of inequality before the crisis than developing economies, but were also more diverse.

Similarly, inequality distribution observed through top 1% earners suggests that income shares in the advanced countries are more heterogeneous, with a pronounced concentration of countries where the top 1% income share is above 10%, which is not the case in the developing countries.

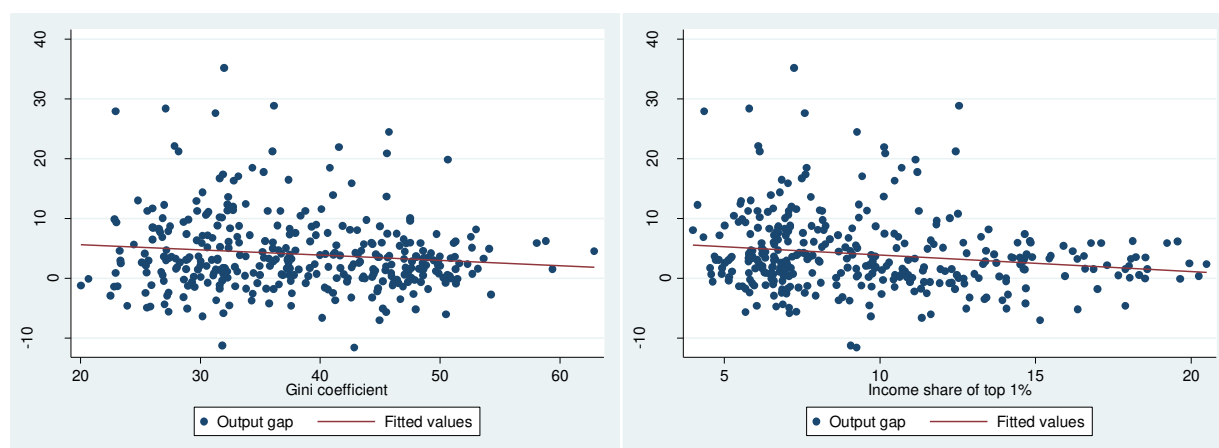
Figure 1 – Inequality before the crisis in advanced and developing economies



Source: Authors' calculations.

Figure 2 presents the correlation between the output gap during the crisis and the inequality before the crisis. There is slight negative correlation – whichever inequality indicator is used – suggesting that early inequality may imply deeper output drops.

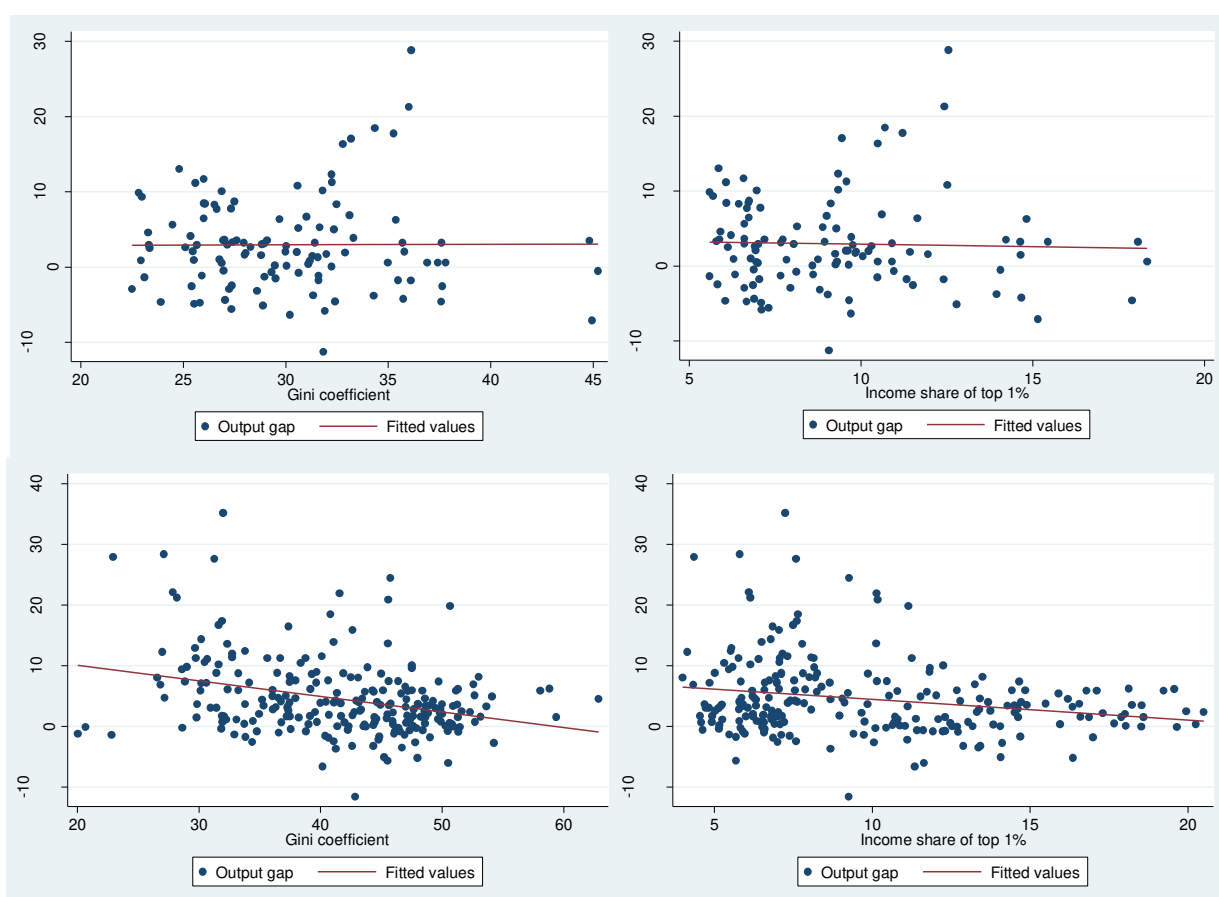
Figure 2 – Output gap during the crisis (2007-2009) and income inequality before the crisis



Source: Authors' calculations.

However, when the sample is disaggregated on advanced and developing economies, some differences emerge. Figure 3 replicates Figure 2 for developed (upper two graphs) and for developing economies (lower two graphs). It is noticeable that the negative correlation on **Figure 2** is sourced in the developing sample only, i.e. that the correlation likely does not exist in the advanced economies. Hence, while developing economies faced lower income inequality before the crisis, they also, on average, faced deeper output declines at higher levels of inequality. This aligns with the notion that the two groups should be observed separately.

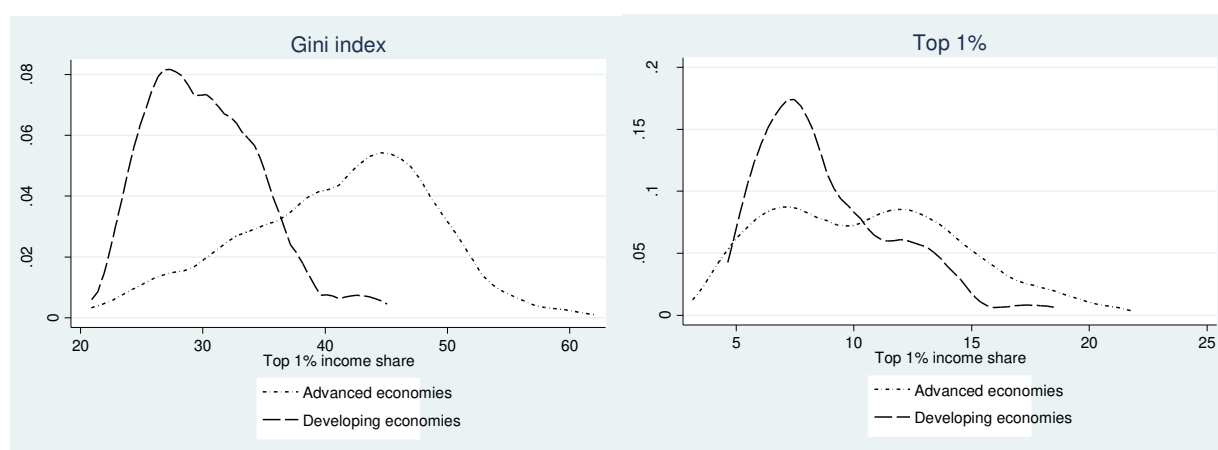
Figure 3 – Output gap during the crisis (2007-2009) and income inequality before the crisis – advanced (upper graphs) versus developing (lower graphs) economies



Source: Authors' calculations.

The average income inequality across countries after the crisis increased at 41% (Gini) and at 10.6% (top 1%). Both – developed and developing countries – noted an increase in both indicators, despite the pre-crisis differences have been maintained (**Figure 4**). However, interestingly, the top 1% share distribution clearly started becoming double-humped, the second hump being formed in the 10-15% range of the income share, and more pronounced among the advanced economies.

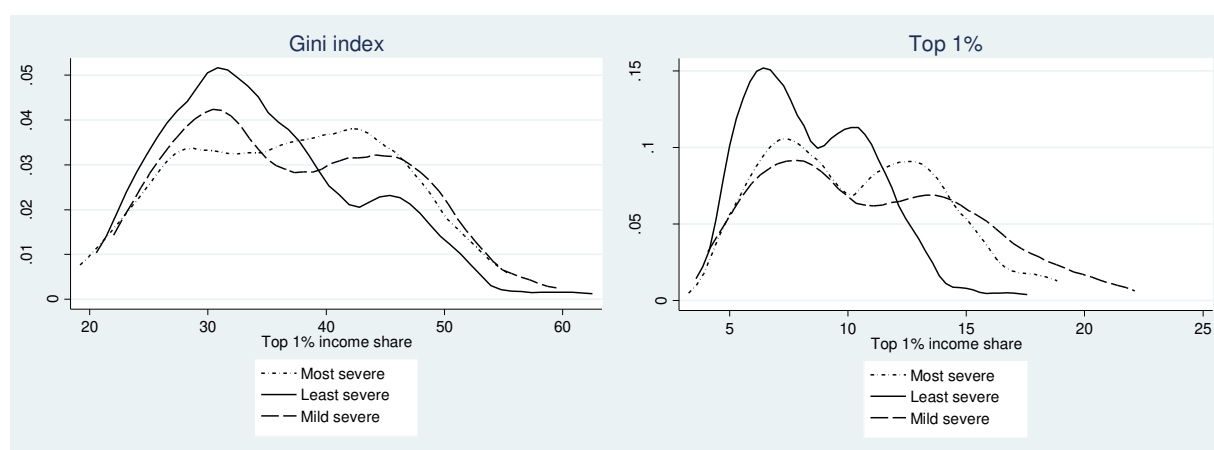
Figure 4 – Inequality after the crisis in advanced and developing economies



Source: Authors' calculations.

Figure 5 presents the distributions of inequality by dividing the sample of countries based on the severity of the crisis over the period 2007-2009. Countries have been classified on those with high severity, mild and low or no severity (hence, including countries which experienced high positive output gap). The classification is based on the tertile in which the country belongs, applied on the output gap variable. On the graphs below, moving from the short-dashed through the long-dashed to the solid line refers to a move from high to low/no crisis severity. The graphs suggest that higher severity is associated with higher inequality, the latter being (re-)structured through the emergence of a second hump.

Figure 5 – Inequality after the crisis and the severity of the crisis

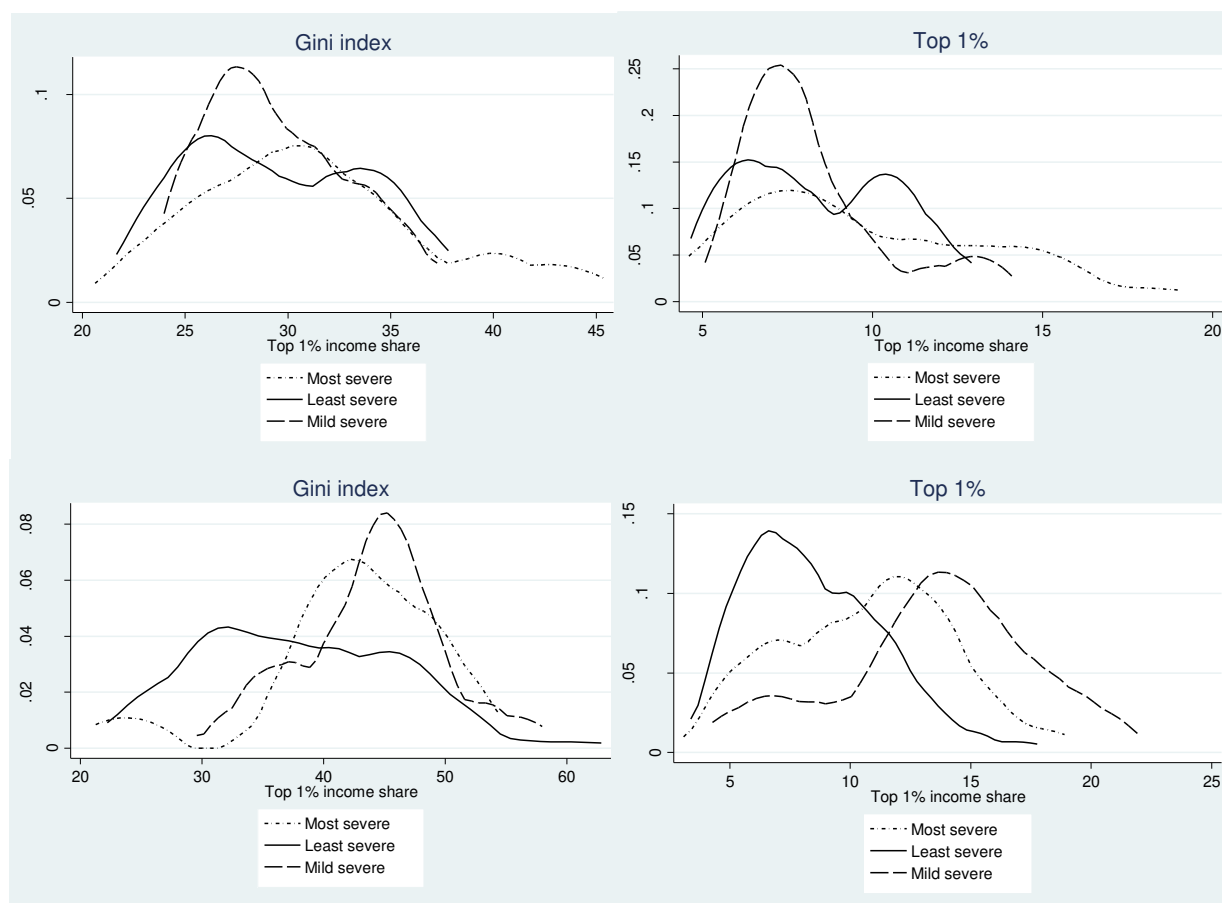


Source: Authors' calculations.

The general conclusion, though, likely does not refer to advanced economies (**Figure 6**, upper), as no robust inter-pattern among the three lines could be established. However, it refers to developing economies even forcibly (**Figure 6**, lower graphs). Observing the left lower graph – distribution of the Gini index – the left-skewness of the Gini distribution for developing countries with high and mild

severity of the crisis is evident, as compared to those with low/no severity. The same conclusion is valid when the top 1% income share distribution is observed (lower right graph).

Figure 6 – Inequality after the crisis and the severity of the crisis: advanced (upper) versus developing economies (lower graphs)



Source: Authors' calculations.

Overall, pre-crisis inequality is likely negatively correlated with the severity of the subsequent crisis 2007-2008, but the conclusion is likely valid for developing economies, despite advanced economies faced higher levels of pre-crisis inequality. The picture – in terms of inequality level differences - did not considerably change after the crisis. It seems that the severity of the crisis has been negatively impinging on the post-crisis inequality: higher post-crisis inequality is observed in countries who went through more severe output declines. Again, nonetheless, the conclusion is likely valid only for the developing economies.

In what follows, we upgrade the analysis, through establishing the relationships in a regression, hence controlling for additional effects.

3. Methodology and data

The essence of this paper consists of two parts: the one examining the role of the early inequality for the severity of the subsequent crisis, while the other the role of the severity of the crisis on the post-crisis inequality developments. To achieve the first objective, we rely on the following economic model:

$$severity_i = \alpha + \beta_1 inequality_{i,t_{pc}} + \sum \gamma_n X_i + \varepsilon_i \quad (1)$$

Whereby: $severity_i$ is the severity of the crisis measured through the difference between the current GDP and the average/potential GDP for country i , as percentage of the potential GDP; $inequality_{i,t_{pc}}$ is a measure of inequality of country i before the crisis (hence the subscript (t_{pc})), appearing in two forms: the Gini coefficient and the income share of the richest 1% of the population. X_i includes other explanatory variables, to control for certain influences: variables which are commonly used in the literature: government consumption, credit and inflation. By having these three variables in the equation, the effect of the two key policies – fiscal and monetary – for the support of the economic activity, including output stabilization, have been captured. α stands for the constant, while ε_i is the usual idiosyncratic error which is assumed to be well-behaved.

To achieve the second objective, we rely on the following economic model:

$$inequality_i = \alpha + severity_{i,t_{cr}} + \beta_1 benefits_i + \beta_2 tax_i + \sum \gamma_n X_i + \varepsilon_i \quad (2)$$

Whereby: inequality and severity of the crisis are as in (1), with the distinction that severity refers to the crisis period (hence the subscript (t_{cr})); $benefits_i$ refers to the government spending on social benefits in GDP, tax_i is the share of personal income tax and social contribution in GDP; while X_i includes a set of variable to capture labor market context: labor market regulations, cooperation in labor-employer relations, effectiveness of antimonopoly policy, flexibility of wage determination, and labor market efficiency. α and ε_i are as before.

Equations (1) and (2) are calculated through OLS. This is the most commonly used econometric technique, which gives the association between different variables. In addition, we use Bayesian econometrics. Bayesian econometrics is the alternative branch of econometrics, which does not rely only on information from measured data, but also uses insights from economic theory. Simply put, it combines researchers' beliefs about the relationship between variables with information from the measured data. The Bayesian technique that will be used is the Bayesian model averaging (BMA). This technique is appropriate when there is uncertainty regarding the underlying theoretical model and when there are many explanatory variables. It is suitable in our case because we do not have a clear theoretical model for our analysis, and we have a large number of explanatory variables. BMA, in essence, estimates all the possible models of the available variables and calculates weighted averages of these models in order to produce the estimates. It is, therefore, an objective way to derive inference

in situations in which there are many variables, which makes the classical approach subjective. BMA is applied in a similar fashion as the OLS, i.e. for the same two questions.

The analysis is cross-sectional (cross-country), i.e. the unit of analysis will be different countries in the same point of time. However, as noted in (1) and (2), there are variables which refer to a previous time period, hence introducing limited time dimension in the model.

Data on inequality are from the Standardized World Income Inequality Database of Frederick Solt (2013). This is currently the most comprehensive database on income inequality that covers 146 countries for the period since 1960. It combines several sources on income inequality and standardizes them. Other data are from standard sources, such as the databases of the International Monetary Fund and the World Bank. The output gap is obtained by HP filtering (standard lambda of 1600) and is expressed as % of the potential output. All used variables and their definitions and sources are provided in the Appendix.

4. Results

4.1. Is inequality a factor for crisis severity?

We embark on presenting and discussing the results. **Table 1** presents the findings for the relationship between the inequality before the crisis and the crisis severity. Recall, crisis severity is captured through the output gap, suggesting that the lower the output gap (as % of the long-term output), the severer the crisis felt. Inequality is represented through two variables: the net Gini coefficients and the share of the top 1% earners in each country. The results are presented for three years: 2007, 2008 and 2009. This is done to capture the different timings of the crisis manifestation: it started in the US in 2007, but has been transmitted to other countries in 2008 and felt onto the economies in late-2008 or 2009. Actually, for a large share of developing economies, 2009 has been the year registering output declines. Then, for each of these years, we use three variants of the inequality measures in terms of their before-crisis timings: the year before, two years before and three years before. Hence, e.g. for the crisis severity in 2008, we test whether inequality level measured in 2005, 2006 and 2007 has had a significant relationship with it.

Results are quite appealing. Wherever the Gini index before the crisis was higher by 1 percentage point (p.p.), the crisis was severer by 0.2 p.p. to 0.28 p.p. of the potential GDP. Therefore, a country with a Gini of 46% (cca. the third quartile of the Gini distribution), on average, experienced deeper output contraction by 3.4 p.p. to 4.8 p.p. of its potential output, compared to a country with a Gini of 29% (cca. the first quartile of the Gini distribution).

Similarly, wherever top 1% earners earned additional 1 p.p. of country income, the crisis has been severer by 0.22 p.p. to 0.31 p.p. of the potential GDP. This implies that, a country where top 1% earners

had 11% of country income (cca. the third quartile of the top 1% distribution), on average, experienced higher output contraction by 1.1 p.p. to 1.6 p.p. of its potential output, compared to a country where top 1% earned 6% of total income (cca. the first quartile of the distribution). Hence, overall, income inequality measured through the top 1% earners was less severe for output during the crisis than the one approximated through the Gini index.

However, when moving along time (from 2007 to 2009), it is noticeable that the relationship of the income distribution with crisis severity strengthens when inequality is measured through the top 1% income share, while strengthens in 2008 and then vanishes in 2009 when it is measured through the Gini index. This may suggest that both inequality measures follow different properties, which may actually be the case. Namely, many countries during the crisis embarked on fiscal spending which likely affected the overall income distribution (i.e. was aimed at increasing the income share of the poor), but not necessarily affected the pace with which the income of the top 1% grew.

Table 1 – Baseline results

2007						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.218*** (0.068)		-0.200*** (0.063)		-0.209*** (0.063)	
Top 1% share (lagged)	-0.223** (0.111)		-0.251** (0.107)		-0.271** (0.105)	
Government consumption	-0.117* (0.070)	-0.101 (0.084)	-0.116* (0.064)	-0.11 (0.071)	-0.119** (0.059)	-0.116* (0.066)
Credit	0.0128* (0.007)	0.0245*** (0.008)	0.00722 (0.008)	0.0194** (0.008)	0.00452 (0.008)	0.0174** (0.008)
Inflation	0.544** (0.215)	0.522** (0.217)	0.418** (0.202)	0.402* (0.206)	0.392* (0.199)	0.374* (0.203)
Constant	11.28*** (3.133)	4.226** (2.018)	11.87*** (3.066)	5.758*** (2.001)	12.69*** (3.041)	6.384*** (1.997)
Observations	118	118	131	131	130	130
R-squared	0.205	0.141	0.173	0.117	0.178	0.117
2008						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.279*** (0.081)		-0.259*** (0.079)		-0.244*** (0.072)	
Top 1% share (lagged)	-0.292** (0.115)		-0.261** (0.110)		-0.277** (0.109)	
Government consumption	-0.0389 (0.066)	-0.0205 (0.080)	-0.0443 (0.057)	-0.0267 (0.071)	-0.048 (0.049)	-0.0415 (0.056)
Credit	-0.0220* (0.011)	-0.00614 (0.011)	-0.0199* (0.011)	-0.00477 (0.010)	-0.0202* (0.010)	-0.00409 (0.009)
Inflation	0.351** (0.158)	0.320** (0.154)	0.302** (0.144)	0.285** (0.142)	0.262** (0.125)	0.254** (0.127)
Constant	15.28*** (4.359)	6.392** (2.833)	14.72*** (4.207)	6.212** (2.616)	14.52*** (3.829)	6.647*** (2.335)
Observations	110	110	114	114	125	125
R-squared	0.216	0.133	0.191	0.113	0.187	0.106
2009						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.114 (0.078)		-0.113 (0.074)		-0.118 (0.080)	

Top 1% share (lagged)		-0.316*** (0.111)		-0.301*** (0.109)		-0.283** (0.113)
Government consumption	-0.00584 (0.119)	0.0193 (0.096)	8.03E-06 (0.030)	0.0021 (0.027)	0.00264 (0.030)	0.00491 (0.027)
Credit	-0.0444*** (0.011)	-0.0406*** (0.010)	-0.0422*** (0.011)	-0.0362*** (0.008)	-0.0423*** (0.011)	-0.0362*** (0.008)
Inflation	0.217* (0.125)	0.184 (0.125)	0.227* (0.118)	0.207* (0.118)	0.187 (0.115)	0.164 (0.118)
Constant	7.933 (5.206)	6.095** (2.737)	7.486* (4.285)	5.674** (2.242)	7.703* (4.543)	5.521** (2.288)
Observations	99	99	107	107	111	111
R-squared	0.279	0.296	0.271	0.287	0.263	0.273

*Source: Authors' calculations. *, ** and *** refer to statistical significance at the 10, 5 and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroskedasticity.*

Interestingly, the government consumption and credit are negatively correlated with the output gap in some of the specifications. In particular, the government consumption is negatively correlated with the gap in 2007, while the credit in 2008 and 2009. However, as we rely on contemporaneous relationships for these two, they could be understood as the immediate reactions of economic policies when the crisis hit: faced with declining output (mainly manifested through a cease of capital inflows, reduction of investment consumption and export), fiscal authorities embarked on increasing of government consumption, while monetary authorities – to the extent exchange rate flexibility permitted – embarked on accommodative monetary policy implying eased credit conditions. In both cases, hence, the correlation between the output gap on the one side, and government consumption and credit, on the other, is negative, and potentially implies a reverse causation. On the other hand, the relationship with inflation is expectedly positive.

As we are uncertain regarding the underlying theoretical model and the inclusion of the explanatory variables, we provide results from the Bayesian model averaging technique. **Table 2** suggests that our previous findings and conclusions are corroborated.

Table 2 – Bayesian model averaging

2007						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.226*** (0.062)		-0.204*** (0.054)		-0.209*** (0.054)	
Top 1% share (lagged)	-0.202 (0.138)		-0.240* (0.128)		-0.268** (0.128)	
Government consumption	-0.0461 (0.065)	-0.0234 (0.049)	-0.0493 (0.065)	-0.029 (0.054)	-0.0589 (0.069)	-0.0365 (0.059)
Credit	0.00165 (0.006)	0.0101 (0.013)	0.000448 (0.003)	0.00379 (0.008)	0.000148 (0.003)	0.00236 (0.007)
Inflation	0.474*** (0.151)	0.392* (0.210)	0.347** (0.164)	0.21 (0.192)	0.323* (0.168)	0.164 (0.180)
Constant	11.57*** (2.895)	4.458* (2.354)	11.76*** (2.540)	6.375*** (2.031)	12.36*** (2.555)	7.181*** (2.044)
Observations	118	118	131	131	130	130
2008						

	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.243*** (0.073)		-0.225*** (0.070)		-0.216*** (0.062)	
Top 1% share (lagged)	-0.291* (0.159)		-0.261* (0.151)		-0.277** (0.139)	
Government consumption	-0.00462 (0.024)	-0.00245 (0.021)	-0.00566 (0.025)	-0.00325 (0.022)	-0.00669 (0.026)	-0.00538 (0.025)
Credit	-0.00867 (0.014)	-0.00122 (0.006)	-0.00772 (0.013)	-0.00128 (0.006)	-0.00985 (0.014)	-0.00121 (0.005)
Inflation	0.403*** (0.138)	0.325** (0.138)	0.341** (0.146)	0.268* (0.145)	0.282* (0.147)	0.226 (0.140)
Constant	11.99*** (3.720)	5.700** (2.291)	11.62*** (3.687)	5.757** (2.327)	11.94*** (3.657)	6.137*** (2.216)
Observations	110	110	114	114	125	125
2009						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.110* (0.064)		-0.109* (0.060)		-0.116** (0.057)	
Top 1% share (lagged)	-0.334** (0.136)		-0.308** (0.124)		-0.294** (0.116)	
Government consumption	-0.00052 (0.033)	0.00152 (0.032)	-0.00056 (0.015)	-0.00041 (0.015)	-0.00023 (0.014)	-5.16E-05 (0.014)
Credit	-0.0490*** (0.010)	-0.0442*** (0.009)	-0.0461*** (0.009)	-0.0402*** (0.009)	-0.0462*** (0.009)	-0.0399*** (0.008)
Inflation	0.0645 (0.120)	0.0411 (0.097)	0.0834 (0.130)	0.0637 (0.115)	0.0513 (0.101)	0.0352 (0.084)
Constant	8.639*** (2.987)	7.398*** (1.780)	8.204*** (2.751)	6.639*** (1.604)	8.517*** (2.588)	6.496*** (1.452)
Observations	99	99	107	107	111	111
<i>Source: Authors' calculations. *, ** and *** refer to statistical significance at the 10, 5 and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroskedasticity.</i>						

Finally, we split the sample on advanced and developing economies, to identify potentially different patterns of the crisis severity – inequality nexus. To preserve space, we present the results for 2008 only. **Table 3** presents the results. Inequality is negatively related with output in both groups, but with apparent differences. If inequality is measured through the Gini, then it exerted slightly severer effect on output during the crisis in developed economies, corroborating the observation on **Figure 1**. However, in the same group, the size of the top 1% earners share was insignificant for the severity of crisis, which may be an unexpected result, but could be reconciled with the heterogeneity of the group (which comprehends countries from Denmark to the US). On the other hand, how much the top 1% grasped from income has been important for the severity of crisis in developing economies and exerted quite large negative effect. Increasing the top 1% income share by 6 p.p. (cca. the move from the first to the third quartile) is related with 1.7 p.p. to 2 p.p. decline in output, which is expectedly larger than the overall effect in **Table 1**.

Table 3 – Results based on the level of country development

Advanced economies						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.346**		-0.326**		-0.320**	
	(0.141)		(0.140)		(0.140)	
Top 1% share (lagged)	-0.2		-0.222		-0.269	
	(0.197)		(0.208)		(0.210)	
Government consumption	-0.249*	-0.136	-0.231	-0.139	-0.219	-0.143
	(0.141)	(0.192)	(0.140)	(0.188)	(0.137)	(0.185)
Credit	-0.0126	-0.0155	-0.0135	-0.0152	-0.0143	-0.0152
	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)
Inflation	1.479***	1.341***	1.458***	1.343***	1.441***	1.342***
	(0.285)	(0.253)	(0.290)	(0.257)	(0.293)	(0.261)
Constant	14.78**	5.017	14.06**	5.236	13.82**	5.698
	(5.715)	(5.259)	(5.557)	(5.227)	(5.354)	(5.182)
Observations	36	36	36	36	36	36
R-square	0.676	0.619	0.67	0.621	0.668	0.626
Developing economies						
	Lag 1		Lag 2		Lag 3	
Gini (lagged)	-0.321***		-0.298**		-0.264**	
	(0.121)		(0.121)		(0.103)	
Top 1% share (lagged)	-0.336**		-0.288**		-0.283**	
	(0.132)		(0.122)		(0.123)	
Government consumption	-0.0331	-0.0289	-0.0374	-0.0341	-0.0406	-0.0481
	(0.071)	(0.076)	(0.060)	(0.066)	(0.051)	(0.052)
Credit	-0.00356	-0.00429	0.00214	0.000106	-0.00199	0.000544
	(0.023)	(0.023)	(0.023)	(0.023)	(0.021)	(0.020)
Inflation	0.241	0.275*	0.198	0.244*	0.173	0.218*
	(0.151)	(0.159)	(0.137)	(0.144)	(0.120)	(0.127)
Constant	17.33***	6.874**	16.48***	6.394**	15.47***	6.621***
	(6.235)	(3.149)	(6.043)	(2.847)	(5.208)	(2.497)
Observations	74	74	78	78	89	89
R-square	0.188	0.105	0.168	0.087	0.166	0.086

*Source: Authors' calculations. *, ** and *** refer to statistical significance at the 10, 5 and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroskedasticity.*

4.2. Does severe crisis undermine income equality?

We next present the results for the relationship between crisis severity and the subsequent inequality outcomes. **Table 4** presents the data based on the OLS method. As before, the output gap is used to reflect the severity with which the crisis hit a country, and is taken to be the average of the 2007-2009 period. While, the inequality is observed per year, in a cross-section context, for the period 2010-2013. However, we control for the time dimension by including a time indicator.

Results provide limited evidence that the severity of the crisis affected the subsequent inequality dynamics. Namely, the output gap is significant only in the equation for the whole sample, when inequality is measured through the income share of the top 1%. However, when the sample is split on advanced and developing economies, this significance is lost. From the controls, some variables are significant in some of the equations, but are frequently not correctly signed, with the exception of tax

wedge and social transfers, whose increase is found to be associated with reduction of inequality, though mainly in developing economies.

Table 4 – Results for inequality (OLS)

	Entire sample		Advanced economies		Developing economies	
	Gini	Top 1%	Gini	Top 1%	Gini	Top 1%
Output gap	-0.114 (0.179)	-0.287*** (0.091)	-0.164 (0.191)	-0.157 (0.115)	0.274 (0.320)	-0.157 (0.159)
Taxes and soc. Contributions (% of GDP)	-0.114* (0.065)	-0.0462 (0.032)	0.0384 (0.079)	0.0449 (0.045)	-0.143 (0.092)	-0.0951* (0.051)
Social transfers (% of GDP)	-0.178*** (0.031)	-0.0260* (0.016)	-0.0448 (0.040)	0.0123 (0.020)	-0.155*** (0.055)	-0.0269 (0.039)
Labour market regulation (0=high to 10 = low)	-0.345 (0.594)	-0.2 (0.301)	-0.212 (0.484)	-0.00619 (0.254)	-1.875** (0.871)	-0.915* (0.523)
Effectiveness of antimonopoly policy (1=low to 7 = high)	-0.0341 (1.831)	-1.035 (0.832)	-1.961 (1.273)	-1.803** (0.856)	5.630** (2.462)	0.216 (1.431)
Labor Market Efficiency (1=low to 7 = high)	-1.782 (2.232)	1.115 (1.318)	1.979 (1.915)	3.317** (1.462)	0.638 (3.551)	0.11 (2.500)
Flexibility of wage determination (1=low to 7 = high)	1.206 (0.824)	0.313 (0.380)	1.643** (0.628)	0.642 (0.468)	-0.482 (1.625)	-0.765 (0.832)
Cooperation in labor-employer relations (1=low to 7 = high)	-1.366 (1.785)	-0.29 (0.860)	-1.397 (0.999)	-1.252 (0.775)	0.311 (2.717)	1.776 (1.657)
Year	-0.591 (1.195)	0.194 (0.602)	-0.293 (0.953)	-0.135 (0.598)	0.0181 (1.946)	0.654 (1.031)
Constant	59.32*** (5.383)	14.38*** (2.975)	32.11*** (5.850)	2.931 (3.285)	38.82*** (10.010)	15.70** (6.984)
Observations	127	127	69	69	58	58
R-squared	0.409	0.19	0.319	0.302	0.229	0.262

*Source: Authors' calculations. *, ** and *** refer to statistical significance at the 10, 5 and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroskedasticity.*

Therefore, as variables' uncertainty is more prevalent in this model, we present and rely on the results from the Bayesian model averaging. This is further important for this equation, as the theoretical model is lacking and hence the inclusion of the control variables may be uncertain. **Table 5** provides these results. They seem more robust. It is clearer that the significance in the top 1% equation for the overall sample is drawn from the developing-countries sample. The coefficient suggests that the smaller the output gap as percent of the potential GDP (inferring severer crisis), implies higher inequality afterwards. In particular, if the output gap has been lower by 1 p.p. of the potential, the subsequent inequality would have increased by 0.24 p.p. The result is valid only for the top 1% inequality in developing economies, and not for the population-wide inequality.

Table 5 – Results for inequality (BMA)

	Entire sample		Advanced economies		Developing economies	
	Gini	Top 1%	Gini	Top 1%	Gini	Top 1%
Output gap	-0.0724 (0.164)	-0.243*** (0.090)	-0.0892 (0.151)	-0.103 (0.099)	-0.12 (0.262)	-0.242** (0.111)
Taxes and soc. Contributions (% of GDP)	-0.0912 (0.082)	-0.0477 (0.043)	0.00141 (0.023)	0.00285 (0.017)	-0.00435 (0.040)	-0.0203 (0.042)
Social transfers (% of GDP)	-0.191*** (0.034)	-0.0139 (0.020)	-0.017 (0.028)	0.000812 (0.007)	-0.0726 (0.080)	-0.0083 (0.022)
Labour market regulation (0=high to 10 = low)	-0.0365 (0.237)	-0.0013 (0.096)	-0.0161 (0.188)	0.0798 (0.231)	-0.197 (0.583)	-0.194 (0.403)
Effectiveness of antimonopoly policy (1=low to 7 = high)	-0.487 (1.203)	-0.65 (0.861)	-0.612 (1.123)	-0.516 (0.949)	1.101 (2.004)	-0.118 (0.533)
Labor Market Efficiency (1=low to 7 = high)	-1.079 (1.751)	0.0936 (0.406)	-0.00235 (0.725)	1.363 (1.694)	-0.108 (1.272)	-0.0331 (0.766)
Flexibility of wage determination (1=low to 7 = high)	0.36 (0.769)	0.157 (0.338)	1.897*** (0.601)	0.67 (0.590)	-0.128 (0.674)	-0.0873 (0.395)
Cooperation in labor-employer relations (1=low to 7 = high)	-1.211 (1.424)	0.00982 (0.194)	-0.237 (0.588)	-0.526 (0.862)	0.327 (1.258)	0.509 (1.013)
Constant	59.15*** (6.272)	14.63*** (3.114)	26.71*** (6.553)	4.051 (3.558)	42.04*** (9.689)	13.03** (5.079)
Observations	127	127	69	69	58	58

*Source: Authors' calculations. *, ** and *** refer to statistical significance at the 10, 5 and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroskedasticity.*

5. Conclusion

The objective of this paper was to contribute to the understanding of the relationship between income inequality and the Global financial crisis of 2007-2008. The paper addressed two sub-questions of the broader topic on the nexus inequality-crisis: first, it assessed whether inequality before the crisis has been related with the severity of the crisis. Then, it analyzed the extent to which crisis severity affected the subsequent inequality dynamics. We relied on a sample of 146 countries, being in that way the most comprehensive study on these issues. Particularly, we put the emphasis on the dichotomy of advanced and developing economies, as most of the previous studies focused on US or the OECD countries. That way, we were able to provide comparative evidence.

Results suggest that income inequality before the crisis potentially contributed to a severer output drops during the crisis. The effect of the overall population inequality (Gini index) has been found severer than the one of the top 1% earners. Moreover, for the advanced economies, the contribution of the inequality of the top 1% earners for the crisis severity is found insignificant. On the other hand, for developing economies, the contribution of the overall inequality for the subsequent crisis severity has been found slightly lower, while the one of the top 1% earners important and fairly large in size. Results

also suggest that crisis severity has been important only for the increase of the income share of top 1% earners in developing economies, in the period after the crisis. Those of them who went through a severer crisis, were followed with faster accumulation of the income in the top 1%.

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Appendix: Variables and sources

Variable	Definition	Source
Gini	Gini coefficient after government redistribution	Standardized World Income Inequality database, version 4, of Solt (2013)
Top 1%	Income share of the top 1% earners	
Output gap	HP filter applied on expenditure-side real GDP at chained PPPs (in mil. 2005 USD), per capita. % of potential output	Penn World Tables, version 8.1 of Feenstra et al. (2015).
Government consumption	Government consumption as % of GDP	World Development Indicators
Credit	Credit as % of GDP	
Inflation	Growth of CPI index, annual	
Social transfers	General government expenditure on social benefits (2001 manual), as a percent of GDP.	International Monetary Fund's Government Finance Statistics
Taxes	General government revenues from taxes and social contributions (2001 manual), as a percent of GDP	
Labour market regulation	Labor market regulations index. Ranges between 0 and 10. Higher values mean lower regulation.	
Effectiveness of anti-monopoly policy	Effectiveness of anti-monopoly policy index. Ranges between 1 and 7. Higher values indicate more effective monopoly control.	Global competitiveness report of the World Economic Forum
Cooperation in labor-employer relations	Cooperation in labor-employer relations index. Ranges between 1 and 7. Higher values indicate better cooperation in labor-employer relations.	
Labor Market Efficiency	Labor Market Efficiency index. Ranges between 1 and 7. Higher values indicate more efficient labor market.	
Flexibility of wage determination	Flexibility of wage determination index. Ranges between 1 and 7. Higher values indicate more flexible wage determination.	