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### **Inflation and the Rich After the Global Financial Crisis**

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# INFLATION AND THE RICH AFTER THE GLOBAL FINANCIAL CRISIS\*

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## ABSTRACT

This paper investigated the link between inflation and the top decile income share after the global financial crisis. The analysis was done on a sample of 42 countries. We found that higher inflation has reduced the income going to the top decile. The main explanation is that inflation has eroded their labour income, differently from the low-income individuals, which has been protected by minimum-wage increases. These findings imply that minimum wages should rise during inflationary episodes in order to prevent rising income inequality.

**JEL:** D31, E31, G01

**Keywords:** inflation, inequality, income distribution, top income share, financial crisis, Great Recession

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## I. INTRODUCTION

Income inequality came to the forefront with the global financial crisis of 2007-2008, with several authors pointing to it as one of the fundamental causes of the crisis (see Stiglitz (2009), Milanovic (2009), Wade (2009), Fitoussi and Saraceno (2010), Rajan (2010), Ranciere and Kumhof (2010)). Now, researchers' attention is focused on changes in inequality after the crisis. Piketty and Saez (2013) find that the top decile/percentile income share, declined in 2008 and 2009 in several developed countries, but that this reversed in 2010. They further argue that without significant policy reforms, the long-term trend of rising inequality is unlikely to change in the future. The volume edited by Jenkins et al. (2013) analyses how income distribution changed after the crisis in 21 OECD countries. The main finding is that it changed a little between 2007 and 2009, due to government support through tax and benefit systems, but that the fiscal consolidation measures are likely to increase inequality in the near future. Agnello and Sousa (2012), Woo et al. (2013) and Ball et al. (2013) focus on the effects of the fiscal consolidation, also arguing that it is likely to lead to greater inequality. In Jovanovic (2014), we analyse changes in inequality after the crisis in 42 countries. We find that the decline in the top decile income share was stronger in countries with higher labour force participation, with an improvement in the control of corruption, with smaller stock exchange recovery and with *higher inflation*.

This paper investigated the relationship between inflation and the top decile income share (the rich) after the recent financial crisis, in greater detail. First, it assessed whether the negative relationship that has been found in [Jovanovic] can be interpreted as causal or not. Then, it analyses how it can be explained.

Results suggest that inflation seems to have been an equalising factor for income inequality after the crisis. The main explanation is that countries that have experienced higher inflation during this period have also seen an increase in their minimum wages. This has protected low-income individuals' real income, but has not affected the income of the rich, which has been eroded by inflation. Hence, minimum wages should rise during inflationary periods, to prevent increases in income inequality.

Section II gives a brief overview of the empirical literature on the relationship between inflation and inequality. Section III presents the data and the methodology. Section IV investigates the relationship between inflation and the change in the top decile share of income, using cross-country data, and assesses whether it can be interpreted causally. Section V delves more deeply into the underlying mechanisms that can explain the relationship, using both cross-country and household-survey data. Section V concludes.

## II. OVERVIEW OF THE EXISTING EMPIRICAL LITERATURE

The inflation-inequality nexus has attracted researchers' attention for some time. No consensus has been reached on the issue. Studies on the US have usually found that inflation reduces inequality. Bach and Ando (1957) analyse the redistributive effects of inflation in the US during 1939-1952, while Bach and Stephenson (1974) during 1946-1971. They find that inflation has decreased inequality, by shifting income from business profits to wages and salaries, and from lenders to borrowers. Blinder and Esaki (1978), Blank and Blinder (1985) find that inflation has benefitted the poor in the US. Jantti (1994), Bishop, Formby and Sakano (1995) and Mocan (1999) have also found that inflation improves income equality. Dincer (2014) is an exception. Using panel data for US states, he finds that inflation increases income inequality.

Cross-country studies, on the other hand, predominantly document that inflation has adverse effects on equality. Romer and Romer (1998) and Easterly and Fischer (2001) use cross-country data and find that inflation hurts the poor most severely. Blejer and Guerrero (1990) and Silber and Zilberfarb (1994) find that inflation has raised income inequality in the Philippines and Israel, respectively. Beetsma and van der Ploeg (1996), Al-Marhubi (1997), Al-Marhubi (2000), Dolmas, Huffman and Wynne (2000), Albanesi (2007), Crowe (2006) also establish a positive correlation between inflation and inequality across countries, but for different reasons. They argue that high inequality leads to higher inflation.

Several studies have pointed at the non-linear effects of inflation on inequality. Bulir and Gulde (1995), Bulir (2001) and Galli and van der Hoeven (2001) find that high inflation

worsens inequality, but low inflation – does not. Similar findings are presented by Dollar and Kraay (2002) who find that stabilisation from high inflation increases the income share of the poor.

Thus, it seems that the effect of inflation on inequality depends on the circumstances, as well as on the magnitude of the inflation.

### III. DATA AND METHODOLOGY

This paper analysed changes in the top decile share of income. We preferred to work with a top income share measure, since most of the pre-crisis changes in income inequality, at least in the developed economies, were at this part of the distribution (see Piketty and Saez (2013)). We chose to work with the top decile share, instead of the top percentile, because data on the former was available through several different sources, which increased the number of observations. Three different sources were used: the World Top Income Database (WTID) of Alvaredo et al. (2013), Eurostat, and the World Development Indicators (WDI) of the World Bank. For the countries that had data in more than one database, the primary source was the WTID, and then Eurostat. The change in the top decile income share after the crisis was defined as the average annual change between 2007 and the last data point (2010 or 2011). The following 42 countries were analysed: Argentina, Austria, Belgium, Bulgaria, Canada, Colombia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Moldova, Netherlands, New Zealand, Norway, Paraguay, Peru, Poland, Portugal, Romania, Singapore, Slovakia, Slovenia, Spain, Sweden, United Kingdom, United States, and Uruguay.

The three data sources differed in their methodology for calculating the top income shares. The WTID compiles the data from tax records, the other two, from surveys. Hence, the top income shares in the WTID are higher than in the other two, because it excludes the lowest income individuals. Still, the difference between the WTID and the other two seems to be rather stable over time. Thus, the differences in the methodologies did not represent a

problem in our analysis, because our focus was on the within-country changes in inequality, not on levels. As support for this, the post-crisis change in inequality in the two countries that have post-crisis data both in the WTID and the Eurostat, seemed to be very similar. The top decile income share in Denmark increased after the crisis (2010 vs. 2005-2007), by 1.1 percentage point, according to the WTID data. According to Eurostat, the increase was 0.6 percentage points. Similarly, the top decile share increased in Sweden in 2011, compared to 2005-2007, by 1 percentage point, according to the WTID data, while according to Eurostat, the rise was 0.1 percentage points.

Table 1 shows the average annual change in the top decile share after the crisis, the last data point and the data source for each country.

The starting point in the analysis was a simple regression which regressed the change in the top decile income share after the crisis on the average inflation during the crisis (2008-2010). To assess the underlying mechanisms in greater detail, data from household surveys were used. More precisely, the changes in income after the crisis (2010 vs. 2007) from the three main sources (labour, capital and social transfers) for households with different levels of income were compared. The household survey data were from the Luxembourg Income Study (LIS (n.d.)).

## IV. INFLATION AND THE TOP DECILE SHARE

### *IV.A. Basic results*

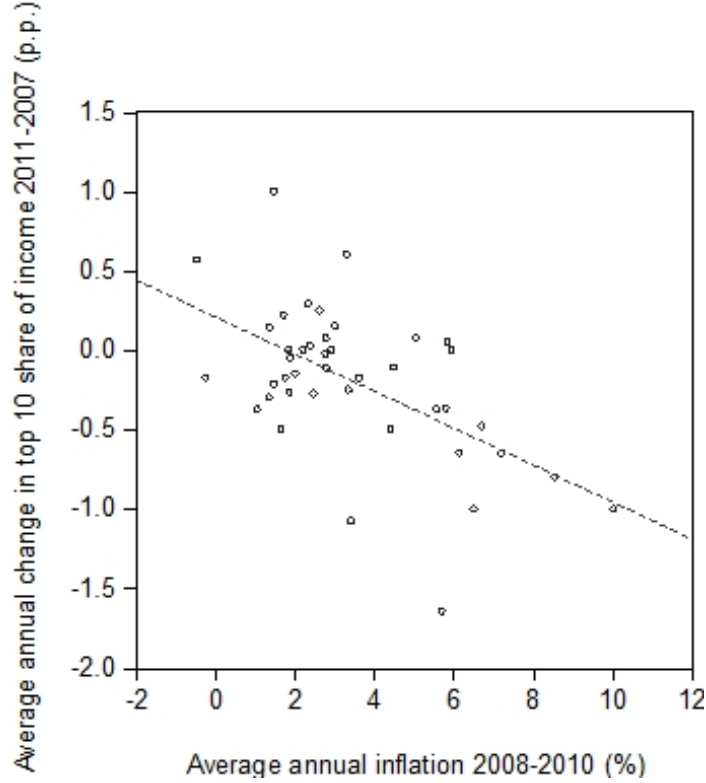
Figure 1 plots the change in the top decile income share after the global financial crisis, against the inflation during the same period for the 42 analysed countries. One can observe that there was a clear negative correlation between the two: higher inflation in the post-crisis period was associated with a higher decline in inequality. Equation 1 shows the results when the change in the top decile income was regressed on inflation. The coefficient on inflation was significant at the 1 percent level. Its size, if it could be interpreted causally, implies that raising inflation by four percentage points would reduce the top decile income share by a half

TABLE 1: CHANGE IN THE TOP DECILE INCOME SHARE AFTER THE CRISIS ACROSS COUNTRIES

Country	Change	Last point	Source	Country	Change	Last point	Source	Country	Change	Last point	Source
Ecuador	-1.64	2010	WDI	Cyprus	-0.27	2011	Eurostat	Czech R.	0.00	2011	Eurostat
Peru	-1.08	2010	WDI	Spain	-0.27	2010	WTID	Latvia	0.00	2011	Eurostat
Iceland	-1.00	2011	Eurostat	Greece	-0.25	2011	Eurostat	Slovakia	0.03	2011	Eurostat
Romania	-1.00	2011	WDI	Canada	-0.21	2010	WTID	Bulgaria	0.05	2011	Eurostat
Argentina	-0.80	2010	WDI	Japan	-0.18	2010	WTID	Hungary	0.08	2011	Eurostat
Uruguay	-0.65	2010	WDI	Finland	-0.18	2011	Eurostat	Slovenia	0.08	2011	Eurostat
Dominican R.	-0.65	2010	WDI	Poland	-0.18	2011	Eurostat	Sweden	0.14	2011	WTID
Estonia	-0.50	2011	Eurostat	Luxembourg	-0.15	2011	Eurostat	UK	0.15	2011	Eurostat
Netherlands	-0.50	2011	Eurostat	New Zealand	-0.11	2010	WTID	US	0.22	2011	WTID
Moldova	-0.48	2010	WDI	Colombia	-0.11	2010	WDI	Malta	0.25	2011	Eurostat
Lithuania	-0.38	2011	Eurostat	Italy	-0.05	2011	Eurostat	Denmark	0.29	2010	WTID
Portugal	-0.38	2011	Eurostat	Norway	-0.02	2011	Eurostat	Ireland	0.57	2010	Eurostat
Paraguay	-0.37	2010	WDI	Austria	0.00	2011	Eurostat	Singapore	0.60	2010	WTID
Germany	-0.30	2011	Eurostat	Belgium	0.00	2011	Eurostat	France	1.00	2011	Eurostat

percentage point per annum, on average, *ceteris paribus*. In other words, raising inflation from 2 to 6 percent, for a 5-year period, would reduce the top decile income share by 2.5 percentage points.

FIGURE 1: INFLATION AND CHANGE IN INEQUALITY AFTER THE CRISIS



$$\begin{aligned}
 \text{top10\_ch} &= 0.21 - 0.12^{***} \text{inflation} \\
 &\quad (0.10) \quad (0.02) \\
 n &= 42; \bar{R}^2 = 0.32
 \end{aligned}
 \tag{1}$$

The results did not seem to be driven by outliers or certain countries, as can be inferred from Table 2. Column 2 shows the results when the regression was estimated using the robust regression technique of Andersen (2008). In column 3, we estimated the equation using quantile regression, which used the median of the variables, instead of the mean. In columns 4 to 7, we randomly removed 8 countries (20 percent of the sample) and estimated the regression on the reduced sample. In all the cases the results remained virtually unchanged. Column



8 shows the regression when the standard errors were bootstrapped, instead of analytically obtained (in small samples, it is often preferable to work with bootstrapped standard errors).<sup>1</sup> The standard errors remained the same. Lastly, in column 9 we allowed for non-linear effects of inflation on inequality, following Bulir and Gulde (1995), Bulir (2001) and Galli and van der Hoeven (2001), by including a quadratic term of the inflation. In this way we allowed for the possibility that low inflation has a positive effect on inequality, but high inflation has a negative (or vice versa) effect. As can be seen, both inflation and inflation squared were negative. This demonstrated that the effect was negative both for high and low values of inflation. The size of the coefficients was such that the marginal effect of the lowest inflation in the sample (-0.5 percent) was approximately 0.07, while the effect of the highest value (10 percent) was around 0.12. Both were very close to the effect from the baseline specification. Both inflation and inflation squared were individually insignificant, but jointly significant. Hence, we dismissed the possibility that the results were driven by the observations with high values for inflation and decided to proceed with the specification with only a linear term for the inflation.

1. The results are obtained with 3000 replications, with the seed 26011982 in Stata.

TABLE 2: ROBUSTNESS

	-1-	-2-	-3-	-4-	-5-	-6-	-7-	-8-	-9-
	Baseline	Robust	Quantile	Eliminat.	Eliminat.	Eliminat.	Eliminat.	Bootstrap.	Adding
		regres-	regres-	20% of	20% of	20% of	20% of	stand.	squared
		sion	sion	sample	sample	sample	sample	errors	inflation
inflation	-0.12***	-0.10***	-0.13***	-0.11***	-0.12***	-0.10***	-0.10***	-0.12***	-0.07
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.09)
inflation <sup>2</sup>									-0.005
									(0.01)
Constant	0.21**	0.17*	0.28***	0.20	0.25*	0.18	0.12		0.15
	(0.10)	(0.10)	(0.10)	(0.13)	(0.13)	(0.12)	(0.10)		(0.17)
Obs.	42	42	42	34	34	34	34	42	42
$R^2$	0.320	0.316	.	0.243	0.297	0.269	0.244	.	0.324
inflation= inflation <sup>2</sup> =0									
(p-value)									0.000

Dependent variable in all regressions is change in top 10 share. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Robust standard errors in parentheses

#### IV.B. Omitted variables

This association, of course, could not be interpreted causally straightforwardly. It may happen that some omitted variables that affect both the change in the top decile income share and the inflation were driving the results. The literature on determinants of inequality identifies several groups of factors that affect inequality and may affect inflation at the same time (see Roine, Vlachos and Waldenström (2009), Scheve and Stasavage (2009), Afonso, Schuknecht and Tanzi (2010), Jovanovic (2014)). The first group refers to economic activity. GDP growth is widely recognised as one of the main drivers of inequality, ever since Kuznets

(1955). Since GDP growth may also affect inflation, through the Phillips curve, failure to control for its influence is likely to bias the results. Economic activity in certain sectors, like the financial sector, may also affect both inequality and inflation. The second group of factors is related to *public policy*, like taxes, or social transfers, or government size. For instance, an increase in top marginal tax rates is likely to reduce inequality and lead to higher inflation at the same time. The next group comprises factors related to *labour market characteristics*, like labour market regulations or minimum wages. Increase in labour market regulations, or minimum wages, is likely to reduce inequality. It may also lead to higher inflation, through higher labour costs. *Monetary policy* may also affect both inequality and inflation. Monetary expansion may lead to higher inequality, through higher financial income for the better-off individuals (see Coibion et al. (2012)). It is also likely to raise inflation, according to standard new Keynesian models. The next group of factors refers to *institutions and politics* - political parties of certain ideology may pursue inflationary policies and push for higher or lower redistribution. Inflation and inequality may be affected by *productivity* (see Dew-Becker and Gordon (2005)) and *openness* (see Anderson (2005) and Romer (1993)), too. Finally, developments in inequality itself, like *trends or initial conditions*, may affect changes in inequality. For example, if inequality is on a downward trend for a longer period of time, for whatever reasons, and if the trend is somehow correlated with the inflation, the omission of the trend may bias the results.

The standard approach to controlling for omitted variables would be to include all the possible variables in the baseline regression. Due to the low number of observations (42) relative to the number of possibly omitted variables (23), this approach was not reasonable in our case. Instead, we proceeded by including the above-mentioned groups of factors one by one. First we included the variables related to the economic activity, then the variables related to government policy, etc. Table 3 presents the results. The column heading indicates which group of factors was included. In the first column we added the GDP and the stock exchange decline during the crisis and their recovery afterwards, as variables proxying economic activity (the exact definitions of the variables and the data sources are displayed in Table A1 in the

Appendix). In column 2, we added the government size, the top marginal tax rate, the change in the tax rate after the crisis and the increase in social benefits after the crisis. In column 3, we added variables related to the labour market: index for labour market rigidity, the change in the index after the crisis, the labour force participation rate and the change in minimum wages after the crisis. In column 4, we included variables related to monetary policy: the interest rate, the increase in money supply and the portfolio flows. In the fifth column, variables for institutions and politics are included: a measure for the control of corruption, the change in the control of corruption after the crisis and a dummy for leftist governments after the crisis. Column 6 adds productivity and openness. Column 7 adds initial inequality and the pre-crisis trend in inequality. In all the cases the coefficient on inflation remained intact, implying that the negative association between inflation and the change in the top decile income share is not likely to be due to omitted variables.

TABLE 3: ADDING VARIABLES TO THE BASIC REGRESSION

	-1- Crisis and recovery	-2- Govern- ment	-3- Labour	-4- Monetary	-5- Institu- tions	-6- Productiv. and openness	-7- Initial ineq. and trend
inflation	-0.11*** (0.03)	-0.10*** (0.03)	-0.08*** (0.03)	-0.10*** (0.02)	-0.10*** (0.03)	-0.10*** (0.02)	-0.10*** (0.02)
fall_gdp	-0.02 (0.01)						
recov_gdp	0.00 (0.03)						
fall_se	-0.00 (0.00)						
recov_se	0.00 (0.00)						
gov_size		0.01 (0.03)					
tax_top		-0.00 (0.01)					
tax_top_ch		-0.00 (0.02)					
benefits		-0.00 (0.01)					
labour			0.09* (0.05)				
participation			-0.02** (0.01)				
labour_ch			-0.16 (0.15)				
min_wage			-0.00 (0.00)				
ir				0.00 (0.02)			
m2				-0.00 (0.00)			
portfolio				-0.00 (0.00)			
corrupt					0.07 (0.07)		
corrupt_ch					-0.74 (0.48)		
left					-0.15 (0.11)		
prod_ch						-0.01 (0.01)	
open						0.00** (0.00)	
top10_init							-0.02 (0.01)
top10_trend							-0.11 (0.12)
Constant							
	(0.17)	(0.51)	(0.58)	(0.12)	(0.15)	(0.15)	(0.28)
Observ.	39	39	42	40	42	41	41
R <sup>2</sup>	0.345	0.273	0.472	0.324	0.388	0.366	0.379

Dependent variable in all regressions is change in top 10 share. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Robust standard errors in parentheses

To further assess the arguments for omitted variables, we did a Bayesian model averaging exercise (BMA). BMA has gained prominence in recent years in applied research when there is uncertainty about the appropriate theoretical model. BMA addresses the problem of uncertainty by considering information from all available models, instead of selecting only one model. It estimates all the models (i.e., combinations of the variables), using Bayesian techniques. It then weights the models by their goodness of fit, to get the desired statistics. Inferences are usually based on the posterior inclusion probability (PIP) and on the weighted averages of the posterior means and standard errors of the variables. The PIP acts as a measure of the significance of the variables, with values above 0.5 implying significance. The BMA means and standard errors are not directly comparable to the OLS coefficients and standard errors, because they also include models in which some of the variables are zero. A comprehensive explanation of BMA can be found in Hoeting et al. (1999). For a brief introduction, see Jovanovic (2014).

The application of BMA usually requires the setting of priors for the model parameters, the setting of priors for the models and the determination of how to choose from all the available models. In our case, since the number of explanatory variables is rather low, 23, and the number of potential models is therefore only  $2^{23} = 8388\ 608$ , instead of choosing only a subset of models by Markov Chain Monte Carlo methods, we estimated all the potential models. Regarding the model prior, we used the uniform prior, which assumes that all the models have an equal prior probability of being correct. Regarding the prior for the model parameters, we used four different priors: the "hyper g" prior of Liang et al. (2008), the empirical Bayes (EBL) prior of Hansen and Yu (2001), the unit information prior (UIP) of Kass and Wasserman (1995) and the prior of Fernandez and Steel (2001) (FLS). We reported the PIP and the posterior means for the coefficients from the 500 best models.

The results are presented in Table 4, with each column heading denoting which combination the results refer to. The coefficients in bold indicate the significant coefficients, that is, the coefficients with PIP above 0.5. Inflation is the only variable which is significant in all the cases, and the only variable that is significant in the specification with the FLS prior, which is known to select only the most significant variable (see Feldkircher and Zeugner (2009)). We interpreted these results as an additional support to the claim that the identified negative

association between the change in the top decile income share after the crisis and the average inflation during the crisis is not likely to be driven by omitted variables.

TABLE 4: BMA ANALYSIS OF DETERMINANTS OF THE CHANGE  
IN THE TOP 10 PERCENT INCOME SHARE

Variables	Coef. prior: hyper g		Coef. prior: EBL		Coef. prior: UIP		Coef. prior: FLS	
	Post. Mean	PIP	Post. Mean	PIP	Post. Mean	PIP	Post. Mean	PIP
participation	<b>-0.024</b>	<b>0.97</b>	<b>-0.025</b>	<b>0.99</b>	<b>-0.023</b>	<b>0.79</b>	-0.010	0.37
recov_se	<b>0.003</b>	<b>0.65</b>	<b>0.003</b>	<b>0.72</b>	0.002	0.40	0.001	0.13
corrupt	<b>0.067</b>	<b>0.59</b>	<b>0.071</b>	<b>0.62</b>	0.053	0.35	0.018	0.12
<b>inflation</b>	<b>-0.031</b>	<b>0.57</b>	<b>-0.031</b>	<b>0.60</b>	<b>-0.047</b>	<b>0.60</b>	<b>-0.056</b>	<b>0.61</b>
min_wage	-0.003	0.43	-0.003	0.44	-0.003	0.32	-0.002	0.23
open	0.000	0.38	0.000	0.40	0.000	0.30	0.000	0.16
corrupt_ch	-0.241	0.36	-0.311	0.45	-0.134	0.16	-0.034	0.05
fall_se	0.000	0.20	0.000	0.23	0.000	0.11	0.000	0.04
top10_trend	-0.011	0.15	-0.012	0.16	-0.008	0.09	-0.004	0.04
labour	0.006	0.14	0.007	0.17	0.005	0.09	0.003	0.05
prod_ch	-0.002	0.09	-0.002	0.08	-0.003	0.09	-0.003	0.08
benefits	0.000	0.08	0.001	0.10	0.000	0.04	0.000	0.02
recov_gdp	0.001	0.06	0.001	0.06	0.000	0.04	0.000	0.03
top10_init	0.000	0.06	0.000	0.06	0.000	0.05	0.000	0.04
gov_size	0.000	0.05	0.000	0.05	0.000	0.04	0.000	0.03
IR	0.001	0.05	0.001	0.06	0.000	0.03	0.000	0.02
labour_ch	-0.003	0.04	-0.005	0.06	-0.002	0.03	-0.001	0.02
M2	0.000	0.04	0.000	0.04	0.000	0.04	0.000	0.02
portfolio	0.000	0.04	0.000	0.04	0.000	0.04	0.000	0.04
tax_top	0.000	0.04	0.000	0.04	0.000	0.03	0.000	0.02
fall_gdp	0.000	0.03	0.000	0.03	0.000	0.03	0.000	0.03
left	0.000	0.03	0.000	0.03	-0.002	0.04	-0.003	0.03
tax_top_ch	0.000	0.03	0.000	0.03	0.000	0.03	0.000	0.02

#### *IV.C. Reverse causality*

The identified negative correlation between inflation and inequality may be also due to reverse causality. Higher inequality can also lead to higher inflation. As Beetsma and van der Ploeg (1996) argue, in democratic societies with high inequality, the median voter would prefer pro-poor policies, i.e., policies that redistribute income from the rich to the poor. Unanticipated inflation may be one of those policies. Higher inequality will then result with higher inflation. A similar mechanism is proposed by Dolmas, Huffman and Wynne (2000), who argue that with higher inequality, the median voter prefers higher inflation as a way of financing higher government expenditures. Crowe (2006) and Albanesi (2007) also provide models in which higher inequality leads to higher inflation, although for different reasons. In their models, greater income inequality leads to greater inequality in political influence, with the rich having greater political power. If the rich perceive that inflation will favour them, because they may be insulated from the inflation tax, differently from the poor, they may push for inflationary policies.

The arguments for inequality causing inflation are related to political factors. One corollary of this explanation, then, is that one would expect to see that the association between inflation and the change in the top decile income share is significant only in countries with high inequality, or in countries with certain political parties in power. Hence, if the relationship is present irrespectively of the level of inequality or the political party in power, that could be treated as an argument against the hypothesis that the causality goes from inequality to inflation. We next tested if there were structural breaks related to the initial inequality and the political party in power.

Table 5 presents these results. In the first column, we allowed for a structural break for countries with a high initial top 10 percent share, setting the median of the variable as a threshold for a high initial top 10 percent share. The coefficient for the countries with a high initial top decile share is virtually identical to the one for countries with a low initial top decile share. In the second column, we used an alternative measure for the initial inequality - the Gini coefficient in 2005-2007 (data on Gini are from the Standardized World Income Inequality Database of Solt (2009)). Results are very similar to the previous ones. Finally, we checked whether inflation has reduced the top 10 percent share only in countries with



leftist governments during the Great Recession, which are considered to be more inclined to increases in public spending (column 3). It turns out that there were no differences, again. Thus, we interpreted these results as arguments against the hypothesis that the causality in the observed relationship between inflation and the change in the top 10 percent share goes from inequality to inflation.

TABLE 5: REVERSE CAUSALITY

	-1	-2	-3
	High initial top 10 share	High initial Gini	Leftist governments
inflation	-0.11*** (0.032)	-0.09** (0.037)	-0.11*** (0.028)
hi_top10_init	-0.19 (0.197)		
hi_top10_init*inflation	0.00 (0.043)		
hi_gini_init		-0.12 (0.214)	
hi_gini_init*inflation		-0.02 (0.049)	
left			-0.12 (0.199)
left*inflation			-0.01 (0.051)
Constant	0.27** (0.133)	0.22 (0.135)	0.25* (0.133)
inflation+hi_top10_init*inflation (p value)	-0.10*** 0.000		
inflation+hi_gini_init*inflation (p value)		-0.11*** 0.001	
inflation+left_inflation (p value)			-0.12*** 0.006
Observations	42	42	42
R-squared	0.354	0.360	0.352

Dependent variable in all regressions is change in top 10 share.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust standard errors in parentheses

## V. CHANNELS THROUGH WHICH INFLATION MAY HAVE REDUCED THE TOP DECILE SHARE

If one accepts the above arguments for dismissing omitted variables and reverse causality, the next question that arises is - why would inflation reduce inequality after the crisis? The literature identifies several potential channels why this may happen (see Kane and Morissett

(1993), Crowe (2006), Doepke and Schneider (2006), Coibion et al. (2012)). The first one is through low-income and high-income individuals' different sensitivity to inflation of the main source of income. Namely, the main source of income of low-income individuals is wages, which are sensitive to inflation (unless they are indexed), while high-income individuals realize a big part of their income from capital, which is less sensitive to inflation. The second channel is through the types of assets households hold. Low-income individuals usually hold their assets in cash, whose real value is eroded by inflation, while high-income individuals hold most of their savings in equity, real assets, commodities, or certain financial products, which are all inflation-proof. The third channel is through government expenditure. Usually, inflation serves as a windfall for the government, due to the higher revenues and the erosion of public debt, which may lead to higher social transfers, benefiting the poor.<sup>2</sup> The final channel is through the redistribution from lenders (i.e., the rich) to borrowers (i.e., the poor), when the inflation is unanticipated, which would make the poor benefit from higher inflation.

Thus, the finding that inflation has reduced the top decile share after the global financial crisis can be due to: 1) lower sensitivity of the lower-income individuals to inflation, due to increases in their wages during inflationary episodes; 2) low-income individuals holding more of their savings in inflation-proof assets than before, due to financial development; 3) higher government support for the low-income individuals, due to the windfall from the higher inflation; and 4) redistribution from net-lenders to net-borrowers, due to the low interest rates during the Great Recession. We next evaluated these potential explanations, first, using macroeconomic, cross-country data, and then using microeconomic data from household surveys.

### *V.A. Cross-country data*

If low-income individuals have been protected from inflation, through wage indexation or wage increases due to the inflation, one would expect to observe that the negative relationship between inflation and the top decile income share would be present only in countries which are more likely to experience minimum wage increases, such as countries with strong trade

2. It should be noted that this relationship may turn around at very high levels of inflation. If inflation is very high, government revenues may fall, due to time lags in collection, reduce real government spending (the Olivera-Tanzi effect). This effect is likely to benefit the net tax payers (i.e. the rich). However, this effect is unlikely to appear in our sample of countries, where the highest rate of inflation is 10 percent.

unions, or countries that have experienced higher increases in minimum wages. Therefore, we next estimated the inflation-inequality regression, allowing for a differential impact in countries with strong trade unions, and in countries with increases in minimum wages. We measured the strength of the trade unions in two ways. First, we used data on the trade union membership, from the New Unionism Network. Second, we used data on the share of employees covered by collective bargaining, from the International Labour Organization (ILO). Data on minimum wages are obtained from the Doing Business Indicators of the World Bank. In each case, we set the median of the variables as a cut-off point between strong and weak characteristics. More precisely, the threshold for high union coverage is 24.4 percent, the threshold for high collective bargaining coverage is 40.5 percent, and the threshold for a high minimum wage increase is 12.4 percent. The estimations are presented in Table 6, columns 1, 2 and 3.

The negative relationship between inflation and the top 10 percent income share is present only in countries with strong trade unions and high minimum wage increases - the coefficient on inflation is insignificant, but its sum with the coefficient of its cross-product is significant at 1% in all the three specifications. This supports the first hypothesis that the observed relationship between inflation and the top decile income share is due to stronger trade unions protecting the low-income individuals from the adverse effects of inflation through minimum wage increases.

The second channel, through asset holding, is more difficult to assess, because there are no data on the types of assets that low-income and high-income households hold. One proxy variable can be the degree of inclusion of the financial system - in countries with more inclusive financial systems, low-income individuals will also be able to hedge from inflation. One often-used measure of the inclusion of the financial system is the share of bank deposits to the GDP. Using this variable in levels may be problematic, though, because it is determined by many things, like the level of development, or the nature of the financial system (banking vs. stock-exchange). Because of that, we used the rate of growth of the deposits, assuming that countries with higher deposit growth are experiencing a wave of financial development, i.e., financial inclusion. More precisely, we used the growth of the bank deposits before the crisis (2004-2007), from the Financial Access Survey of the International Monetary Fund.

As previously, we divided the countries into two groups - with high and low inclusiveness, using the median of the variable as a cut-off point (1.9 percent), and estimated the regression for the two groups of countries. The results, shown in column 4 of Table 6, point out that there are no differences in the inflation-change in inequality relationship for the two groups of countries. We interpret this as an argument against the second channel.

To assess whether the identified relationship between inflation and the change in the top decile share is due to the stronger government support to the low-income individuals, due to the higher revenues from the inflation, we estimated the basic equation separately for countries with high and low increase in government support through the benefits during the crisis. Again, the median of the variable was used as a threshold for a high increase in government support, resulting in countries with a real increase of more than 1.6% in the benefits after the crisis being treated as countries with a high increase in government support. The results are presented in Table 6, column 5. The relationship holds for the two groups of countries, which implies that the underlying channel is not government support.

Finally, to investigate the last hypothesis, that the relationship is due to redistribution from net-lenders (i.e., the rich) to net-borrowers (i.e., the poor), we estimated the basic regression for countries with low and high interest rates during the crisis. With low nominal interest rates, higher inflation results in low (sometimes even negative) real interest rates. If the relationship is found only in countries with low nominal interest rates during the crisis, then this would support the hypothesis that the negative relationship is due to redistribution. We classified countries into 'low-interest rates' and 'high-interest rates' on the grounds of the average money-market interest rate during 2008-2010, using the median as a cut-off point (1.9 percent). These results are presented in Table 5, column 6. Somewhat surprisingly, the relationship was significant only for the countries with high-interest rates. As an additional check, we allowed the effect of inflation to differ for countries with positive and negative real interest rates. These results are shown in column 7 of Table 6. Again, we found that inflation has reduced the top decile share only in countries with positive real interest rates. We read these results as evidence against the hypothesis for redistribution from lenders to borrowers.

TABLE 6: CHANNELS

	-1- Union density	-2- Collective bargaining	-3- Minimum wage	-4- Financial inclusion	-5- Government benefits	-6- Low interest rates	-7- Negative real rates
inflation	-0.08 (0.054)	-0.03 (0.040)	-0.10 (0.061)	-0.10** (0.040)	-0.10*** (0.029)	-0.03 (0.057)	-0.02 (0.032)
hi_union	0.25 (0.228)						
hi_union*inflation	-0.06 (0.056)						
hi_col_barg		0.23 (0.225)					
hi_col_barg*inflation		-0.11** (0.048)					
hi_min_wage			-0.16 (0.192)				
hi_min_wage*inflation			0.00 (0.065)				
hi_inclusion				0.19 (0.199)			
hi_inclusion*inflation				-0.02 (0.046)			
hi_benefits					0.05 (0.214)		
hi_benefits*inflation					-0.03 (0.050)		
hi_ir_level						0.13 (0.212)	
hi_ir_level*inflation						-0.09 (0.061)	
ir_real_pos							0.09 (0.191)
ir_real_pos*inflation							-0.11** (0.042)
Constant	0.06 (0.217)	0.00 (0.191)	0.23 (0.161)	0.11 (0.177)	0.19 (0.119)	0.07 (0.171)	0.05 (0.112)
inflation+hi_union*inflation (p value)	-0.14*** 0.000						
inflation+hi_col_barg*inflation (p value)		-0.14*** 0.000					
inflation+hi_min_wage*inflation (p value)			-0.10*** 0.000				
inflation+hi_inclusion*inflation (p value)				-0.13*** 0.000			
inflation+hi_benefits*inflation (p value)					-0.13*** 0.002		
inflation+hi_ir_level*inflation (p value)						-0.12*** 0.000	
inflation+ir_real_pos*inflation (p value)							-0.13*** 0.000
Observations	42	42	42	42	42	42	42
R-squared	0.342	0.393	0.340	0.337	0.332	0.366	0.452

Dependent variable in all regressions is change in top 10 share. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Robust standard errors in parentheses

### ***V.B. Household-level data***

The household-level analysis was done using data from the Luxembourg Income Study (LIS). Of the 42 analysed countries, 15 were present in the LIS dataset with data both before and after the crisis (Colombia, Estonia, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, United Kingdom, and United States). Ten of them experienced a decline in the top 10 percent income share after the crisis - Colombia, Estonia, Finland, Germany, Greece, Italy, Luxembourg, Netherlands, Poland and Spain. Only four of these had, at the same time, above-average inflation (i.e., average annual inflation during 2008-2010 above 2.5 percent): Colombia, Estonia, Greece, and Poland. These are the countries on which we focused. We tried to assess to what extent the decline in the top decile share these countries experienced can be explained by inflation, through the four alternative channels that were explained above.

The pre-crisis data refer to 2007, while the post-crisis data to 2010. The unit of observation was a household, not an individual, due to the better coverage in the household-level surveys. They were expressed in per-capita terms and were bottom-coded (i.e., the negative values were replaced with zeroes). They were weighted by the provided weights, so the statistics could be interpreted as referring to the total population. The values for 2010 were deflated by the cumulative inflation during 2008-2010.

The assessment of the relative merit of the alternative channels using micro data was done by comparing the income of the low- and high-income households have earned from different sources before and after the crisis. Households were grouped into ten groups (deciles), depending on the per-capita disposable household income (i.e., gross household income, minus taxes and contributions). Three main sources of income were analysed: labour income, capital income and income from transfers (social security transfers, including pensions, and private transfers, including remittances). The data on the different sources of income were in gross terms, not net, because the taxes for each category of income were not known. Because of this, we did not try to assess the contributions of the changes in the alternative sources of income to the change in total disposable income, but just compared the changes in the different incomes before and after the crisis. It should be also noted that there may be small differences in the income shares in this analysis from the shares in the cross-country analysis,

because the data here were gross, and the data in the cross-country analysis were net.

We begin with Colombia. Colombia had a decline in the top 10 percent income share of income in 2010, with respect to 2005 (no data for 2006 and 2007), of 0.54 percentage points. The average annual inflation during 2008-2010 was 4.5 percent. Table 7 presents the mean per capita income from the three sources for households belonging to different income deciles before and after the crisis.

TABLE 7: MEAN PER CAPITA HOUSEHOLD INCOME  
FOR DIFFERENT HOUSEHOLDS, COLOMBIA

Income decile	Labour income	Capital income	Social transfers
<b>2007</b>			
1	<b>172,240</b>	12,267	1,207
2	<b>666,806</b>	18,942	2,839
3	1,149,795	26,879	75,252
4	1,422,576	21,358	107,363
5	1,725,213	44,865	121,271
6	2,290,361	88,556	191,905
7	2,609,996	91,548	343,572
8	3,366,113	143,173	430,565
9	4,903,635	184,249	790,569
10	<b>12,600,000</b>	<b>1,419,970</b>	2,111,646
<b>2010</b>			
1	<b>257,199</b>	17,609	553
2	<b>841,822</b>	35,816	21,701
3	1,280,106	34,737	111,161
4	1,567,708	34,328	121,756
5	1,877,156	70,596	148,222
6	2,363,258	77,773	187,907
7	2,704,567	123,265	347,103
8	3,573,100	139,300	505,333
9	4,964,984	234,313	761,473
10	<b>11,455,950</b>	<b>1,335,398</b>	2,503,636

In national currency. 2010 figures are in 2007 prices (i.e. deflated).

Bolded figures point main changes.

Several things should be noted. First, poorer households (1st and 2nd decile) experienced a sizeable increase in their labour income between 2007 and 2010. Second, the top decile households experienced a decline in both their labour and capital income. Hence, the previous explanation - that the poor households have been insulated from the adverse effects of inflation, through minimum wage increases, differently from the rich - seems to hold for Colombia. Although trade union coverage is actually very low in Colombia, with only 2 percent of the workers being members, minimum wage has been increased between 2008 and 2010 by 18.7 percent in total. Regarding the decline in the capital income, it has been mostly due to the decline in the rental income, not income from interest. It remains unclear why the rental income declined.

Overall, it can be said that the micro data for Colombia support the previous explanation, at least to some extent - inflation has redistributed income from rich to the poor, mainly through the labour income, as the former have been protected by the minimum wage increases, differently from the latter.

We next turn to Estonia. Estonia has seen a decline of 2 percentage points in 2011 in its top decile income share of income, compared to 2007. The average inflation during 2008-2010 has been 4.4 percent per annum. Table 8 presents its micro data developments.



TABLE 8: MEAN PER CAPITA HOUSEHOLD INCOME  
FOR DIFFERENT HOUSEHOLDS, ESTONIA

Income decile	Labour income	Capital income	Social transfers
<b>2007</b>			
1	<b>4,351</b>	111	26,130
2	<b>15,744</b>	36	26,723
3	26,542	171	23,066
4	34,858	141	20,646
5	48,848	313	13,984
6	62,951	320	10,448
7	68,523	303	9,642
8	75,140	188	8,266
9	98,970	538	8,505
10	<b>148,012</b>	<b>3,563</b>	7,855
<b>2010</b>			
1	<b>6,705</b>	86	18,201
2	<b>8,415</b>	145	34,711
3	26,372	155	18,414
4	25,552	475	24,065
5	31,398	430	23,471
6	48,073	489	14,696
7	58,352	185	13,847
8	68,859	568	11,058
9	78,290	1,065	10,814
10	<b>132,487</b>	<b>1,603</b>	12,671

In national currency. 2010 figures are in 2007 prices (i.e. deflated).

Bolded figures point main changes.

The situation in Estonia seems very similar to that in Colombia - the labour income of the poorest (1st and 2nd decile) increased after the crisis, while labour income of the top decile households declined. The top 10 percent also suffered a decline in their capital income, but the magnitude of this decline is smaller. Union membership in Estonia is also rather low (11 percent), but this did not preclude a rise in the minimum wage, which was increased by 21 percent in 2008. At the same time, the labour income of the top 10 percent was not covered

by this, and has declined after the crisis. Regarding the capital income of the top decile, it is hard to assess the reasons for its decline, because there are no data on income from interests and dividends.

TABLE 9: MEAN PER CAPITA HOUSEHOLD INCOME  
FOR DIFFERENT HOUSEHOLDS, GREECE

Income decile	Labour income	Capital income	Social transfers
<b>2007</b>			
1	<b>1,649</b>	65	1,785
2	1,645	122	3,052
3	2,789	144	2,580
4	3,695	123	2,684
5	4,735	237	2,675
6	6,061	333	2,293
7	7,345	309	2,295
8	8,855	515	2,371
9	12,194	530	2,176
10	<b>20,449</b>	<b>1,790</b>	2,939
<b>2010</b>			
1	<b>601</b>	60	1,350
2	1,334	108	2,663
3	1,928	43	3,300
4	2,843	146	2,603
5	3,729	110	2,973
6	4,268	254	2,874
7	5,139	255	3,155
8	7,280	278	2,496
9	9,026	478	2,791
10	<b>16,547</b>	<b>1,234</b>	3,638

In national currency. 2010 figures are in 2007 prices (i.e. deflated).

Bolded figures point main changes.

Next, we turn to Greece. In Greece, the top decile income share of income in 2011 declined by 1 percentage points vis-a-vis 2007, while average annual inflation has been 3.4

percent during 2008-2010. The decline in the top decile share, as can be seen from Table 9, was mostly due to the decline in the labour income, as a result of the crisis. Differently from Colombia and Estonia, the labour income in Greece declined for households from all deciles, likely due to the severity of the crisis. However, the decline for the lower-income households has been milder (in absolute terms), possibly due to the minimum wage increase of 13 percent during 2008-2010. It can also be noted that the capital income has also declined for the richest households, but, again, it is not possible to assess if this is due to lower interest income, due to unavailability of disaggregated data.

TABLE 10: MEAN PER CAPITA HOUSEHOLD INCOME  
FOR DIFFERENT HOUSEHOLDS, POLAND

Income decile	Labour income	Capital income	Social transfers
<b>2007</b>			
1	867	8	<b>4,313</b>
2	2,060	13	<b>5,464</b>
3	3,093	18	4,600
4	3,877	8	4,108
5	4,738	15	3,761
6	5,745	21	3,545
7	6,783	8	3,194
8	8,273	26	3,164
9	10,524	40	2,838
10	19,856	<b>259</b>	2,325
<b>2010</b>			
1	836	13	<b>5,108</b>
2	2,269	13	<b>6,358</b>
3	3,632	18	4,785
4	4,420	18	4,512
5	5,573	20	4,207
6	6,889	24	3,739
7	8,210	26	3,451
8	10,021	31	3,067
9	12,781	59	2,756
10	22,947	<b>192</b>	2,274

In national currency. 2010 figures are in 2007 prices (i.e. deflated).

Bolded figures point main changes.

Poland, the last country we analyse, is somewhat different. In Poland, the top 10 percent share of income declined in 2011, relative to 2007, by 0.7 percentage points, with an average inflation during 2008-2010 of 3.6 percent per annum. The main reason behind the decline in the top decile income share in Poland is the higher labour income for the other deciles, as well as the higher social transfers for the households from the first two deciles of income. Regarding the latter, it is possible that the increase in the social transfers is due to the

higher government revenues, due to the higher inflation - both inflation and government expenditure on social benefits have been higher during 2008-2010 than in the previous four years, the former by 1.3 percentage points, and the latter by 2.7 percentage points.

To summarize, the micro analysis supported the findings from the cross-country analysis, that higher inflation had some role to play in the decline in the top 10 share of income after the crisis. While the case for redistribution from lenders to borrowers seemed weak for the analysed countries, there was some redistribution through the labour income, since higher income earners were not protected from the higher inflation, while lower income earners were, through higher minimum wages. There was also some evidence in favour of the hypothesis for higher government support through the social transfers.

## VI. CONCLUSION

We investigated the negative correlation between inflation and the change in the income of the rich (the top 10 percent) after the recent global financial crisis. The results do not seem to be driven by omitted variables or reverse causality. Higher inflation seems to have reduced the top decile income share, indeed. Both cross-country and household-survey data seem to suggest that the main channel through which this has happened is that it has eroded the labour income of the rich, but not of the poor, which have been protected by the minimum wage increases. Some evidence is also found for the role of the increased government revenues, due to the inflation, which have been canalized towards higher social transfers.

Compared to the existing literature, our results support the notion that the effect of inflation on inequality depends on the circumstances. It remains to be seen whether the nexus inflation-minimum wages-inequality can be generalized to other periods, or holds only for the recent post-crisis period. Investigating which other circumstances make inflation increase/decrease inequality is also worthwhile.

The size of the effect we identified may seem small at first - increase in annual inflation of one percentage point decreased the share of income going to the top 10 percent by only 0.12 percentage points per year. Still, the effect can be sizeable if observed through a longer period of time - if inflation is increased from 2 to 5 percent, for a period of 15 years, it would reduce the top decile income share of income by 5.5 percentage points. Given that the main

channel through which inflation has affected inequality is the different response of low- and high-income individuals' labour income to inflation, the reduction in the above scenario is likely to be smaller, because it seems unlikely that the labour income of the rich would remain unchanged if inflation averaged 5 percent for 15 years.

Thus, speaking of policy implications, we would not interpret our results as evidence that raising inflation may be a viable measure for decreasing income inequality. Perhaps a better reading of the results is through the measures that should be undertaken during periods of inflation, in order to benefit from it. In other words, our results suggest that inflationary episodes should be accompanied by measures, like minimum wage increases, aimed at protecting the most vulnerable individuals in order to reduce inequality during these times.

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TABLE A1: VARIABLES

Variable name	Variable definition	Source
top10_ch	Change in the top 10 share in 2011 (or 2010, analogously to the last available data point) and the average for 2005-2007.	WTID, Eurostat, WDI.
inflation	CPI inflation, average for 2008-2010.	WDI
fall_gdp	Annual change in real GDP per capita in 2009.	WDI
recov_gdp	Annual change in real GDP per capita in 2010, or average for 2010-2011, analogously to the last data point.	WDI
fall_se	Annual change in the market capitalization of listed companies (as a % of GDP) in 2008. The 2008 was selected instead of 2009 because the financial shock happened in 2009.	WDI
recov_se	Change in the market capitalization of listed companies, as a % of GDP, in 2010 (or 2011) with respect to 2009.	WDI
top10_init	Initial top 10 share, i.e. top 10 share in 2005-2007.	WTID, Eurostat, WDI.
top10_trend	Pre-crisis trend in the top 10 share, i.e. average change in the period 2003-2007.	WTID, Eurostat, WDI.
gov_size	General government consumption in 2010 (or 2010-2011), as a percent of GDP.	WDI
tax_top	Top marginal tax rate in 2010 (or 2010-2011).	EFW
tax_top_ch	Change in the top marginal tax rate in 2010 (or 2010-2011), with respect to 2009.	EFW
benefits	Real change in subsidies and other government transfers in 2010 (or 2010-2011), with respect to 2009.	WDI
labour	Labor market regulation index in 2010 or 2010-2010. Higher index=less regulated.	EFW
participation	Labor participation rate, total (% of total population ages 15+), 2010 or 2010-11	WDI
labour_ch	Change in labor market regulation index in 2010 or 2010-2011, with respect to 2009. Higher value = made less regulated.	EFW
min_wage	Minimum wage, change in 2010 with respect to 2007.	DBI
ir	Money market rate, 2010 (or 2010-2011) minus 2009. In real terms. For the euro area countries, it's the euro area data.	IFS
m2	M2, % of GDP, 2010 (or 2011) vs. 2009.	WDI
portfolio	Portfolio Investment, net, % of GDP. Sum in 2008, 2009 and 2010	IFS
corrupt	Control of corruption index, in 2010 (or 2010-2011). Higher value = higher control.	WGI
corrupt_ch	Change in the control of corruption index, in 2010 (or 2010-2011) with respect to 2009. Higher value = improvement in the control.	WGI
left	Dummy if the country had a leftist government in 2010 or 2011	DPI
prod_ch	Difference between productivity growth in 2000's and 1990's	ILO
open	Exports of goods and services, as a percent of GDP, 2010 or 2010-2011.	WDI

WTID stands for the World Top Income Database of Alvaredo et al. (2013).

WDI stands for the World Development Indicators of the World Bank.

WGI stands for the Worldwide Governance Indicators of the World Bank.

EFW stands for the Economic Freedom of the World dataset of Gwartney, Lawson and Hall (2013).

DPI stands for the Database on Political institutions of Beck et al. (2001).

IFS stands for the International Financial Statistics of the IMF.

DBI stands for the Doing Business Indicators of the World Bank.

TABLE A2: DECSRIPTIVE STATISTICS OF THE VARIABLES USED IN THE ANALYSIS

stats	top10_ch	inflation	fal_gdp	recov_gdp	fall_se	recov_se
mean	-0.20	3.50	-4.83	2.75	-49.70	9.22
sd	0.48	2.31	4.01	3.61	42.24	20.41
min	-1.64	-0.46	-17.55	-6.11	-202.26	-19.86
max	1.00	10.03	2.08	12.75	-0.18	70.28
p25	-0.38	1.85	-6.06	0.50	-65.51	-1.99
p50	-0.16	2.79	-4.55	1.85	-36.67	1.60
p75	0.05	5.57	-3.00	4.36	-19.01	19.27
N	42	42	42	42	39	40

stats	top10_init	top10_trend	gov_size	tax_top	tax_top_ch	benefits
mean	28.94	-0.13	19.08	47.64	0.80	1.07
sd	7.59	0.70	4.76	10.40	4.54	7.56
min	19.77	-1.32	7.51	20.00	-12.00	-28.41
max	45.37	2.20	28.65	69.50	19.00	29.17
p25	22.77	-0.65	16.40	41.00	0.00	-1.27
p50	25.82	-0.20	19.56	47.00	0.00	1.60
p75	35.12	0.27	21.34	54.00	1.00	3.60
N	42	41	42	42	42	39

stats	labour	participation	labour_ch	min_wage	ir	m2
mean	6.58	60.85	-0.03	18.95	-2.24	-4.12
sd	1.24	6.73	0.33	20.43	2.91	19.39
min	4.31	41.00	-0.80	0.00	-12.69	-105.49
max	9.03	76.00	1.18	103.13	3.07	26.65
p25	5.69	57.10	-0.16	7.13	-2.72	-7.75
p50	6.73	60.45	-0.01	12.39	-1.76	0.17
p75	7.53	64.80	0.10	32.00	-0.65	3.18
N	42	42	42	42	41	42

stats	portfolio	corrupt	corrupt_ch	left	prod_ch	open
mean	4.99	0.91	-0.01	0.38	0.12	106.90
sd	42.17	1.02	0.09		3.53	71.65
min	-71.38	-0.89	-0.25	0.00	-5.83	29.18
max	179.45	2.38	0.19	1.00	16.03	385.92
p25	-10.28	-0.03	-0.06		-1.44	56.56
p50	-1.89	1.02	0.00		-0.80	89.27
p75	6.24	1.69	0.06		0.49	136.92
N	41	42	42	42	41	42