Systemic Banking Shocks in the US: the Response of Top Income Shares in a Historical Perspective

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Introduction

- Goal of the research: analysing the response of the share in US total income of different top income groups to the occurrence of systemic banking shocks.

Motivations

- Renewed interest in the inequality-macroeconomy nexus: growing body of literature
- Little attention within the literature on distributional implications of banking crises: here focus on income groups within top decile.
- Genuine interest in the topic. Who take the brunt of recessions? Are crises turning points for income distribution?
- Relevant for policy as high level of inequality is indicated as one of the source of distortion and inefficiency in the economy: Are crisis correcting inefficiencies? (**dichotomy:** *lassez faire* versus Government intervention)

Main Results

- Banking crises exert an overall negative impact on the richest top shares and a positive impact on the poorer groups within the top decile.(“rich are different from the very rich”).
- Crises are no ‘turning points’ *per se*: The effect is relatively small in magnitude and not always persistent over time.

Existing Literature & Contribution of the paper

Novel methodology which synthesis all the approaches to the analysis of aggregate fluctuations and income distribution within the literature:

- Regression-free approach (Atkinson & Morelli, 2011; Jenkins et al. 2013; and Piketty & Saez, 2013)
- Inequality indicators regressed on macroeconomic variables (Beach, 1976, Blinder & Esaki, 1978, Blank & Blinder, 1985)
- Modelling cointegrating relationships between inequality and macro variables (e.g. Neal, 2013) : This addresses the non-stationarity issue (Parker, 2000).
- Fitting parametric distribution function on the income data and regressing parameters on macro variables (Metcalf, 1969; Thurow, 1970 and Jäntti & Jenkins,2010)
- Estimating the elasticity of incomes accruing to different income groups to changes in overall personal income (Parker & Vissing-Jorgensen (2009)).

Plan of the Talk

1. Data under investigation
2. Empirical Analysis and main Results
3. Robustness
4. Interpretation
5. Conclusions

Data on Banking Crises

- US crises under investigation: 1929, 1988, 2007

Banking Crises

Beginning year of **systemic** banking crises only: simple dummy 0/1 identified from (Bordo et al. 2001); (Reinhart and Rogoff, 2008, 2009 and Reinhart, 2010); (Laeven and Valencia, 2009 and 2010)

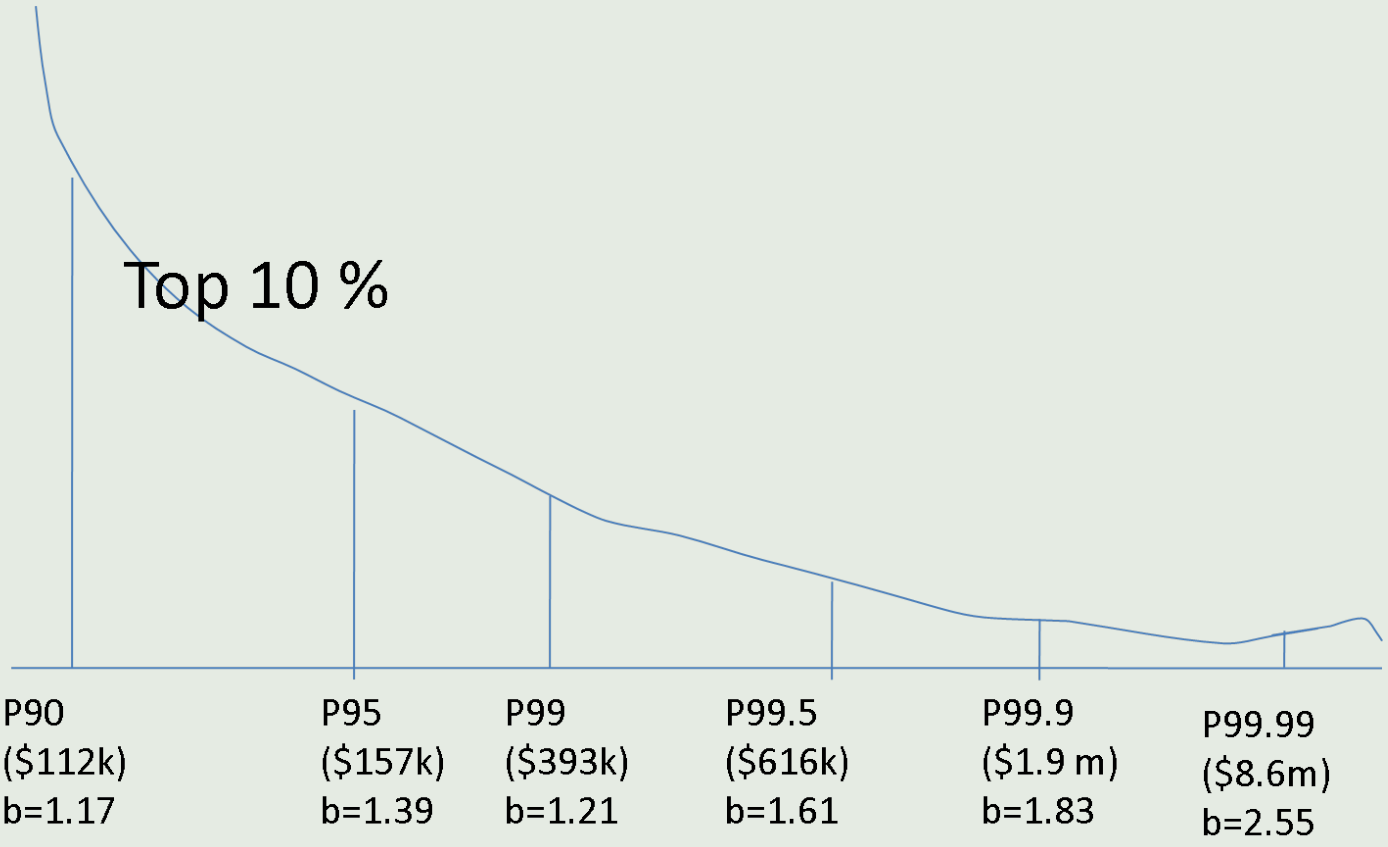
Main problems:

1. heterogeneity in crisis identification
2. when does the crisis end?

Data on top income shares

Top (gross) market income shares. Income ranked excluding capital gains.

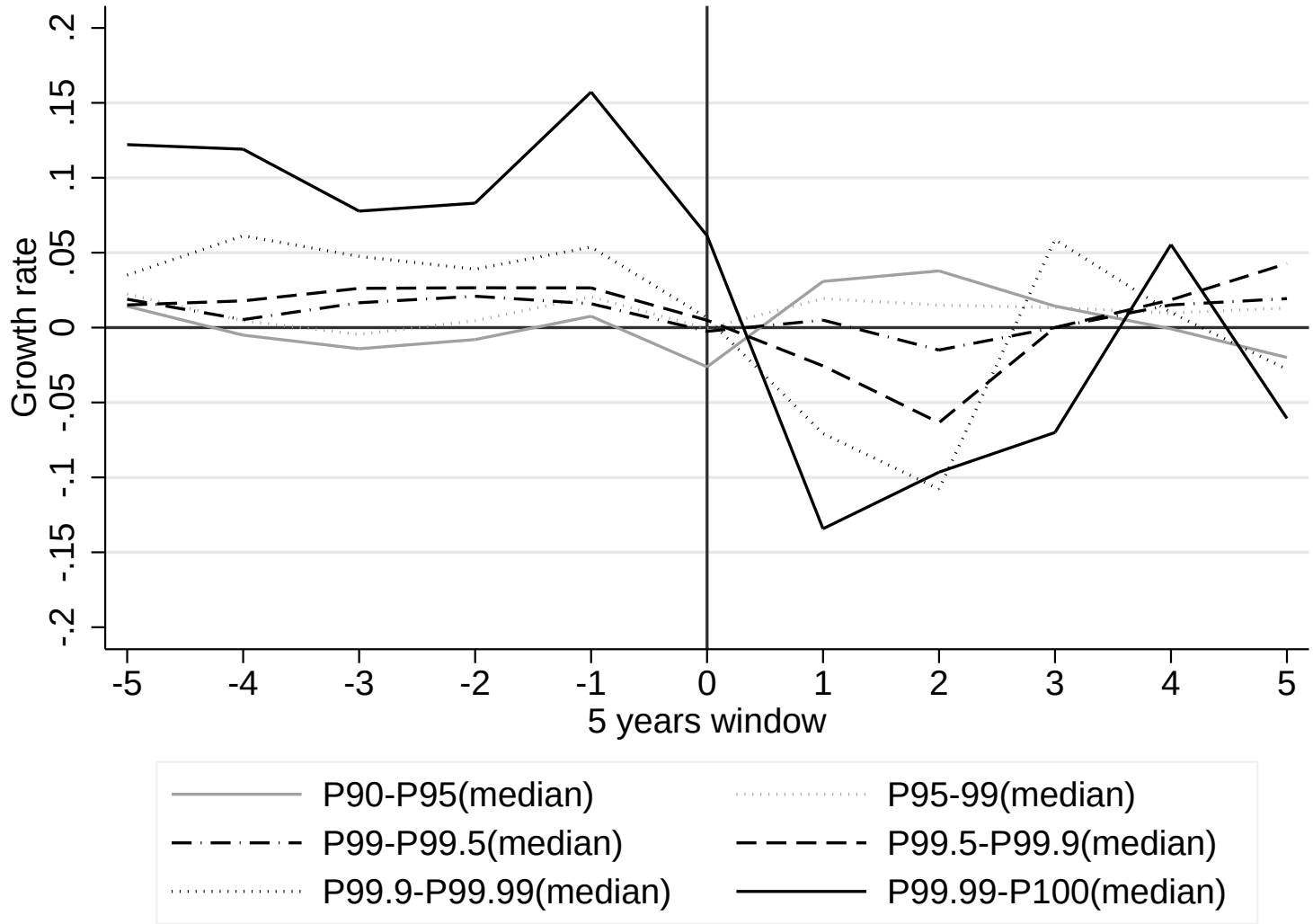
Sketch of a top decile



- Sources: (Piketty and Saez, 2003) and WTID (Alvaredo, Atkinson, Piketty and Saez). Number of tax units in US (millions): 37.7 in 1913; 153 in 2008.

Disadvantages and Advantages

Growth Rates of Top Shares around Crises Episodes



▸ Including CG? ; ▸ Stock Market Crashes?

Counterfactual using Pseudo forecasts

I make use of both the so called 's-steps' forecast model and the dynamic forecast method:

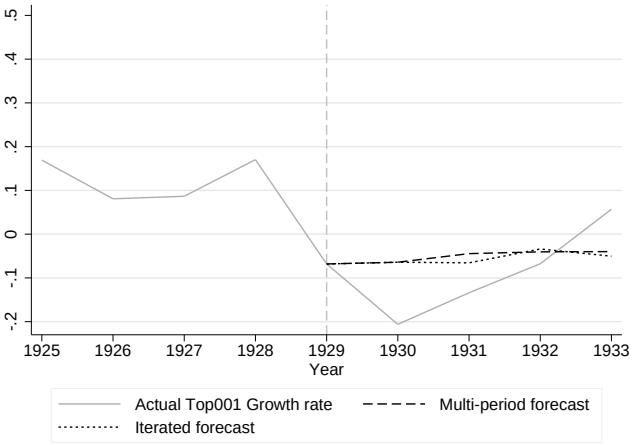
$$g_{i,t} = \alpha_i + \sum_{j=1}^{2} \beta_{i,j} g_{i,t-j} \; + \gamma_i T_{i,t} + \epsilon_{i,t}.$$

Similar to Romer and Romer (1989) and Cerra and Saxena (2008)

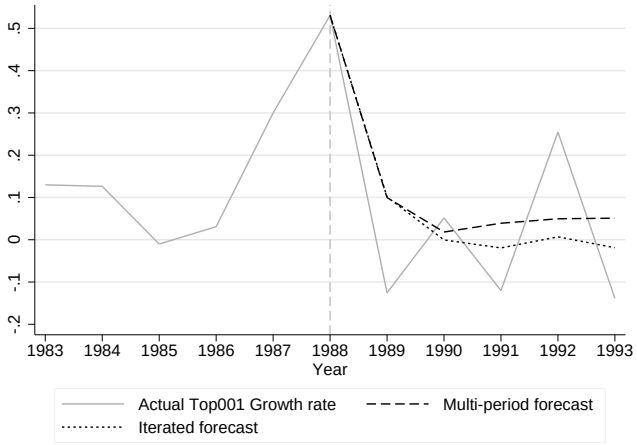
Evidence on Growth rates: Top 0.01%

Figure: Actual vs. Forecasted Growth Rates of Top 0.01% during systemic banking crises

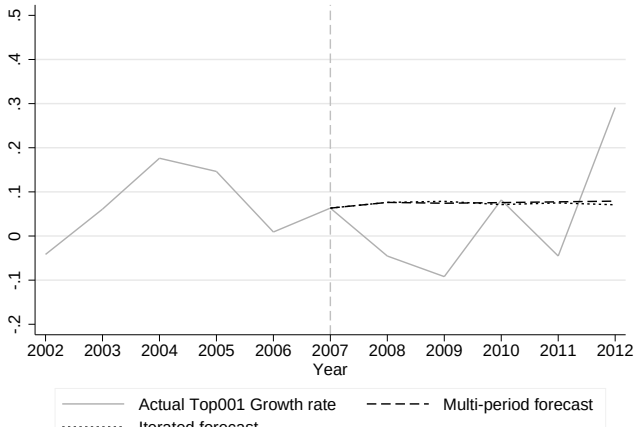
(a) Great Depression - 1929



(b) S&L crisis - 1988



(c) Great Recession - 2007

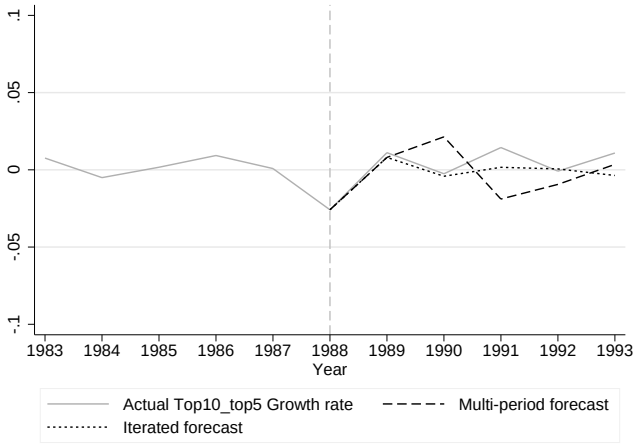


Evidence on Growth rates: Top 10-Top 5%

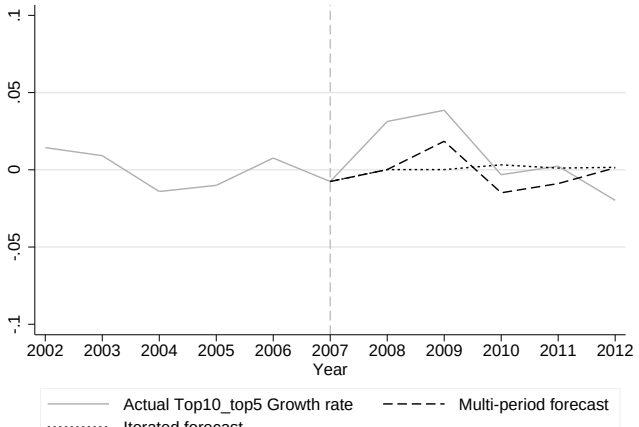
Figure: Actual vs. Forecasted Growth Rates of Top 10-Top 5% during systemic banking crises

(a) Great Depression - 1929

(b) S&L crisis - 1988



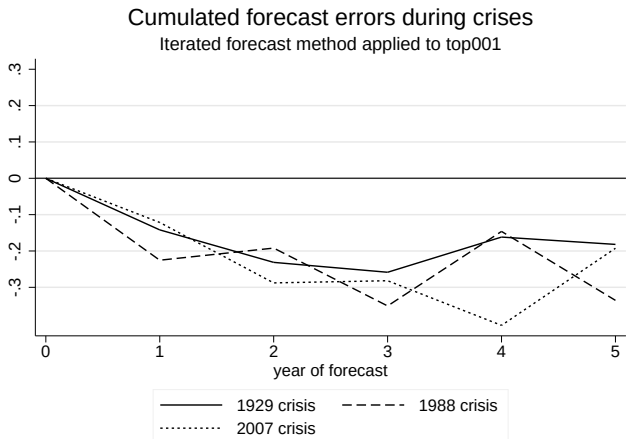
(c) Great Recession - 2007



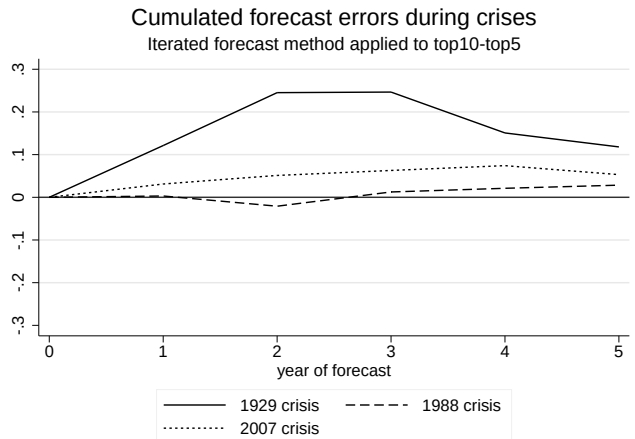
Evidence on the levels

Figure: The unforeseeable impact of systemic banking crises on top shares

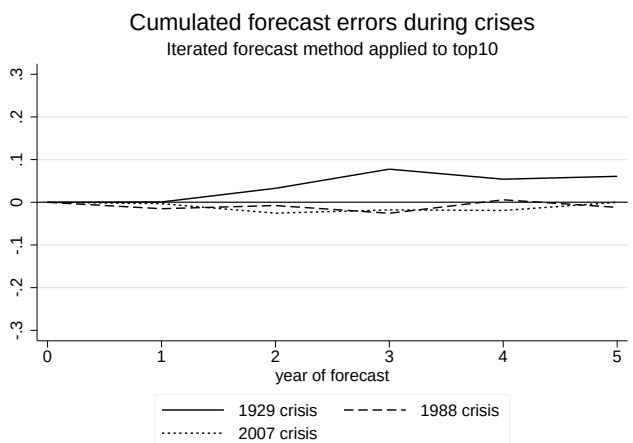
(a) Top 0.01%



(b) Top 10-Top 5%



(c) Top 10%



Counterfactual using dynamic econometrics

ARDL model

$$g_{i,t}^{top} = \sum_{k=1}^{2} \theta_{i,k} g_{i,t-k}^{top} + \sum_{k=0}^{4} \phi_{i,k} BC_{i,t-k} + \rho_i' X_{i,t} + u_{i,t}.$$

Defining the Impulse Response Function

$$I_{T+h}^{G} = g_{T+h}^{top} - E\{g_{T+h}^{top} / F_T, \Theta_{T+h}^{0}\}.$$

Define $F_T = \{g_t^{top}, X_t, BC_t\}$ for every $t = (T, T-1, T-2, ...)$ and the set of "crisis off" values as $\Theta_{T+s}^{0} = \{BC_{T+1}^{0} = 0, BC_{T+2}^{0} = 0, ..., BC_{T+s}^{0} = 0\}$. Following Pesaran and Smith (2012), X_t contains exclusively variables which are invariant to the occurrence of the shock

Counterfactual using dynamic econometrics

ARDL model

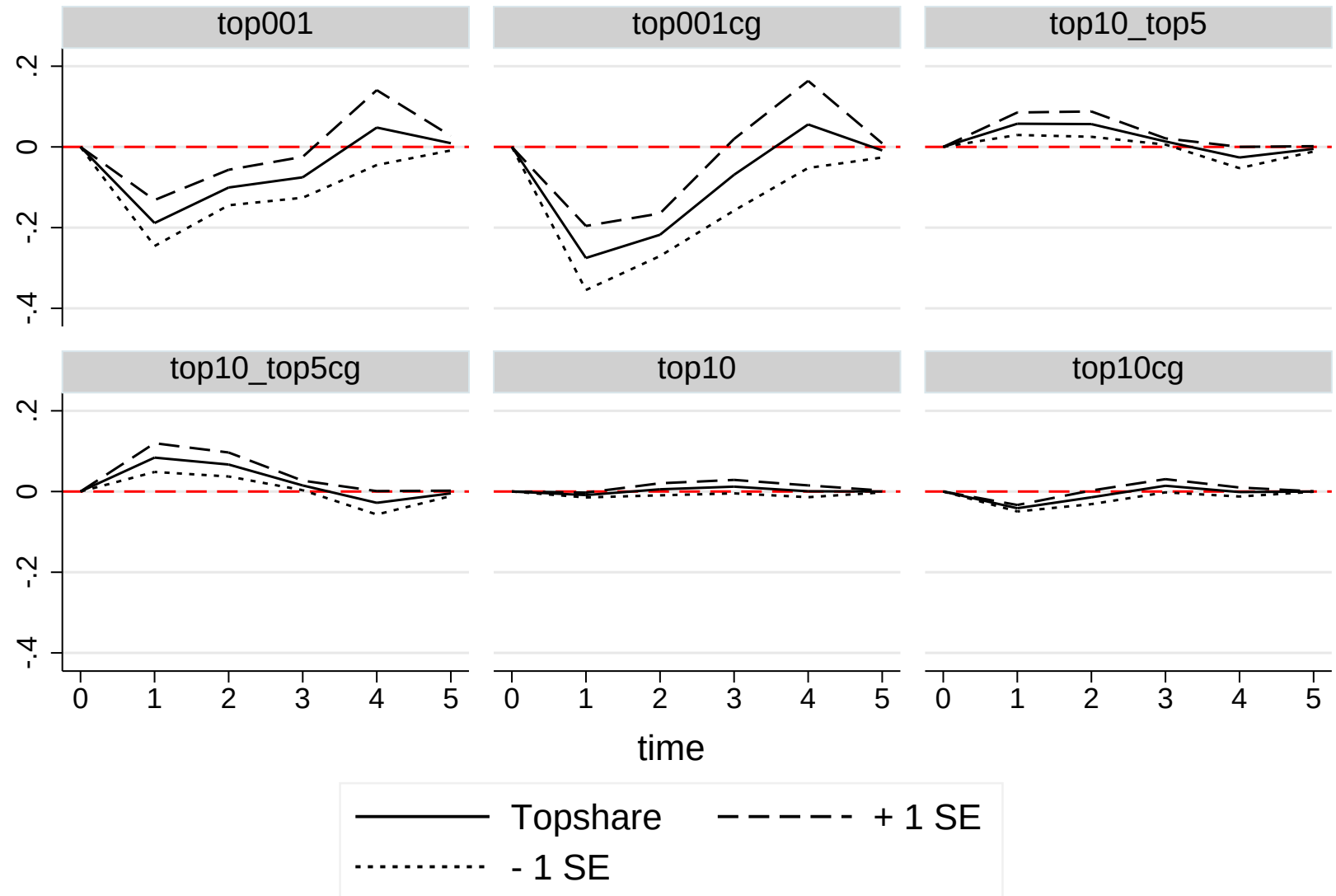
$$g_{i,t}^{top} = \sum_{k=1}^{2} \theta_{i,k} g_{i,t-k}^{top} + \sum_{k=0}^{4} \phi_{i,k} BC_{i,t-k} + \rho_i' X_{i,t} + u_{i,t}.$$

Total effect of BC: Impulse Response Function

$$I_{T+h}^{G} = \begin{cases} \overline{\phi_0} & if \text{ h=0}, \\ \overline{\phi_1} + [I_0^G] * \overline{\theta_1} & if \text{ h=1}, \\ \overline{\phi_h} + [I_{h-1}^G] * \overline{\theta_1} + [I_{h-2}^G] * \overline{\theta_2} & if 2 \geq h \leq 4, \\ \overline{\phi_4} + [I_{h-1}^G] * \overline{\theta_1} + [I_{h-2}^G] * \overline{\theta_2} & if h > 4. \end{cases}$$

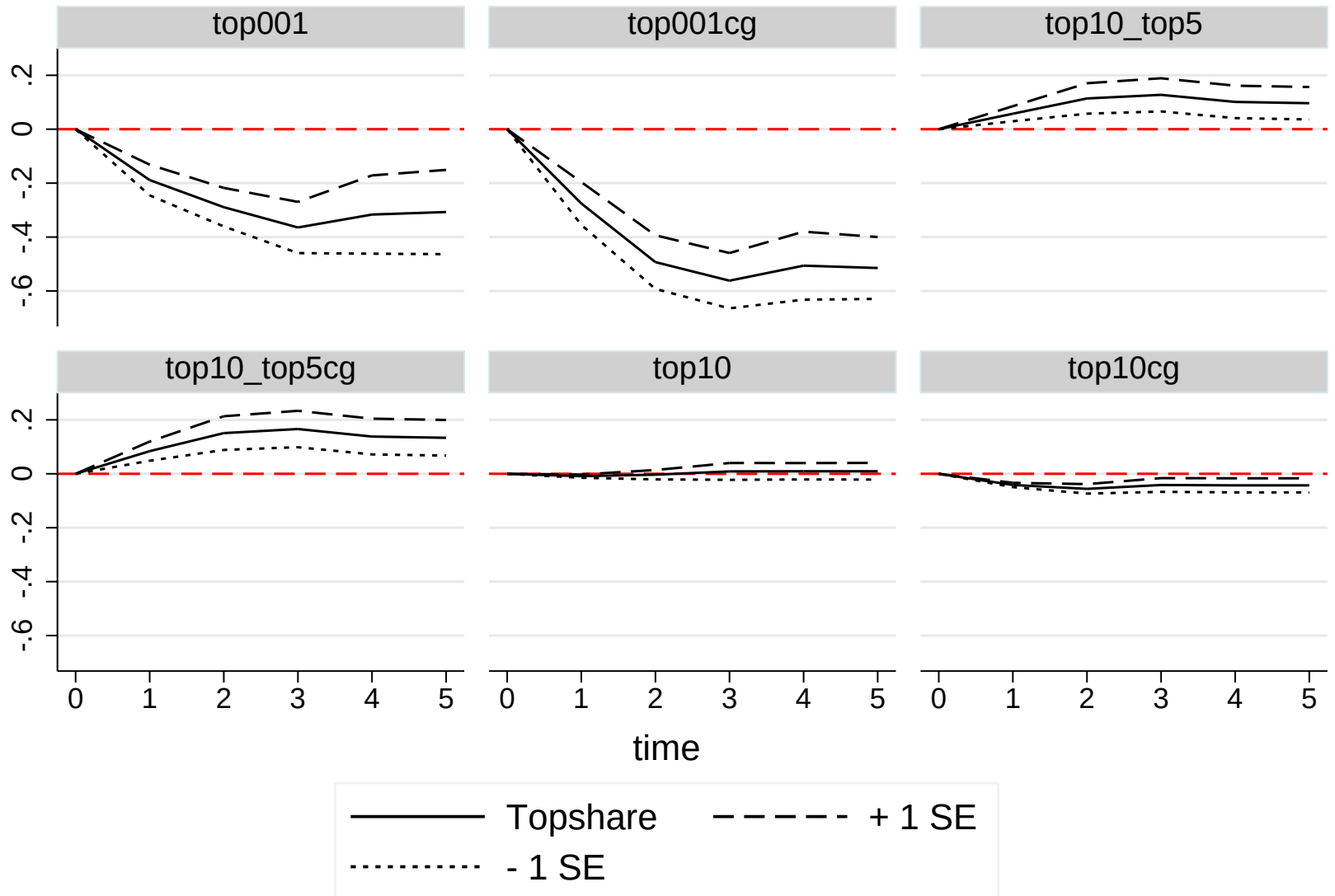
▸ Deriving the IRF

IRF Growth rates- baseline



Graphs by top income groups

IRF Levels- baseline

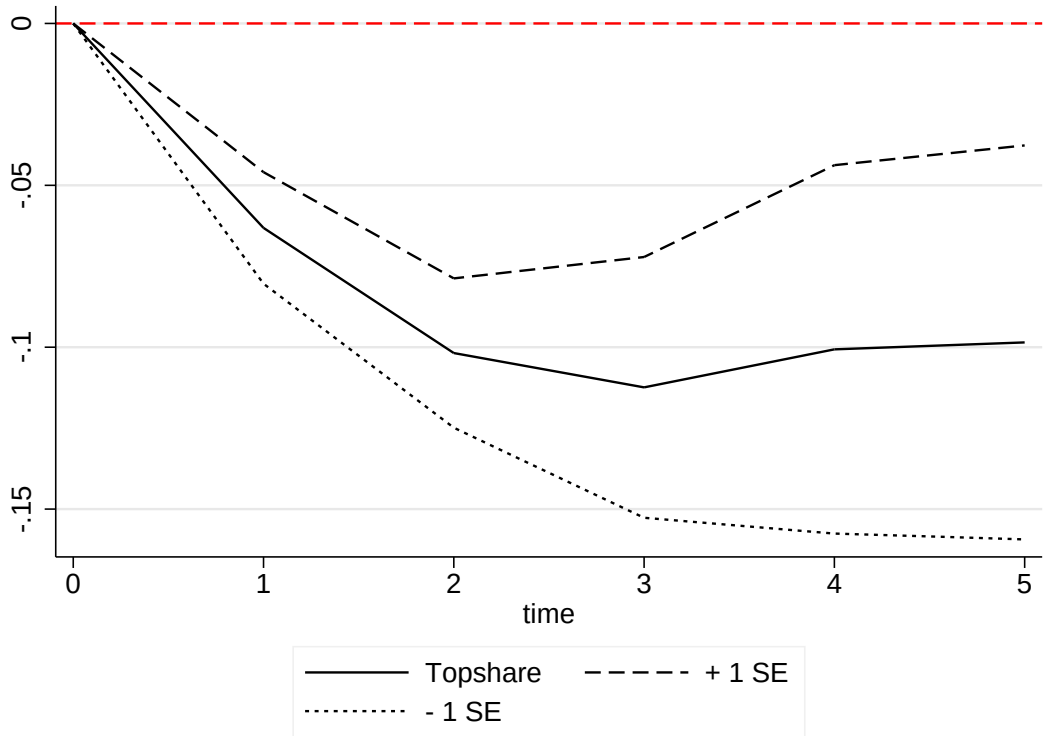


Graphs by top income groups

IRF - Pareto coefficient

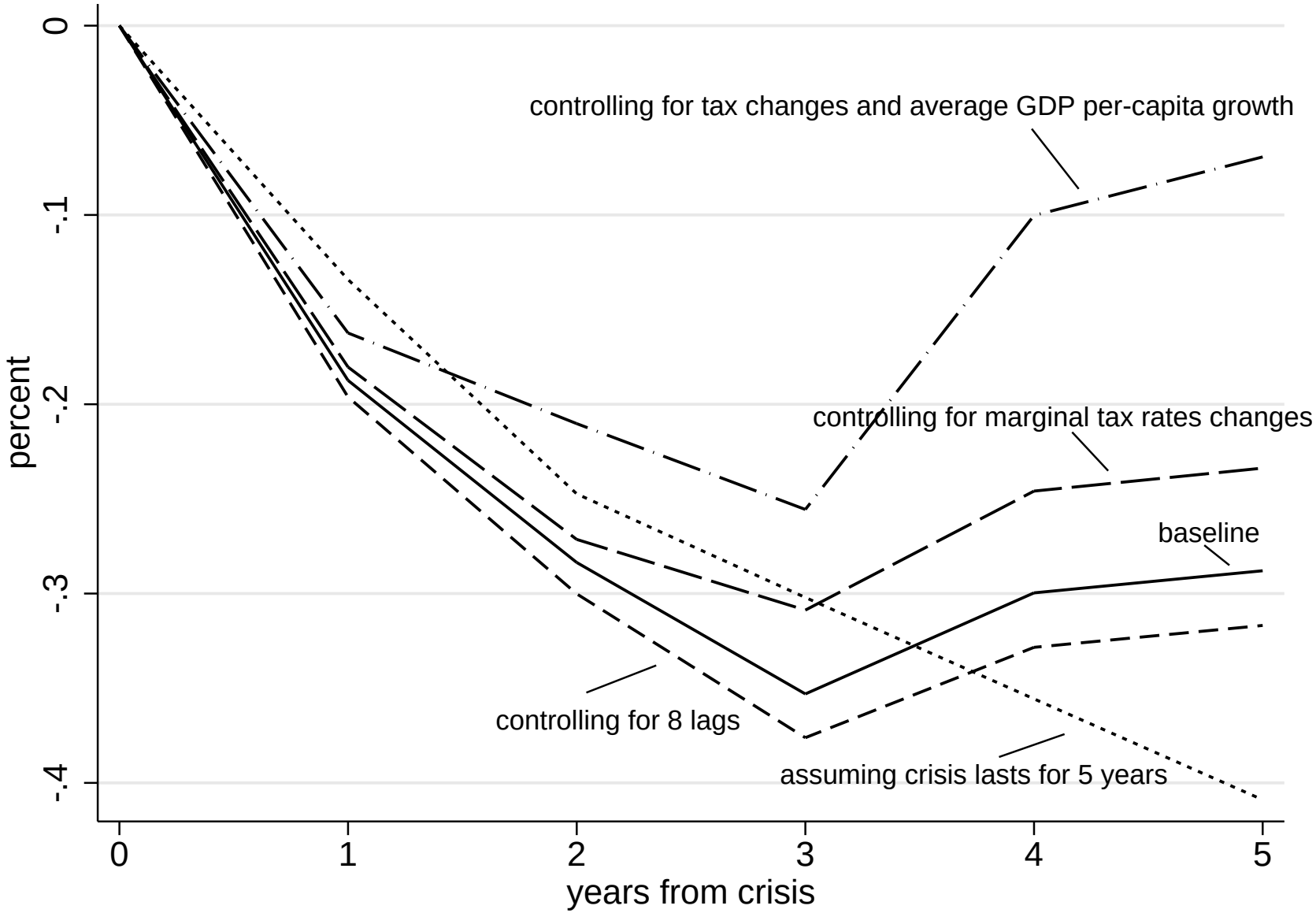
From the Pareto distribution it follows that the average income of tax units with income higher than y_i is a constant multiple of the income threshold y_i:

$$\frac{y_i^{avg}}{y_i} = \frac{\alpha}{\alpha - 1} = \beta$$

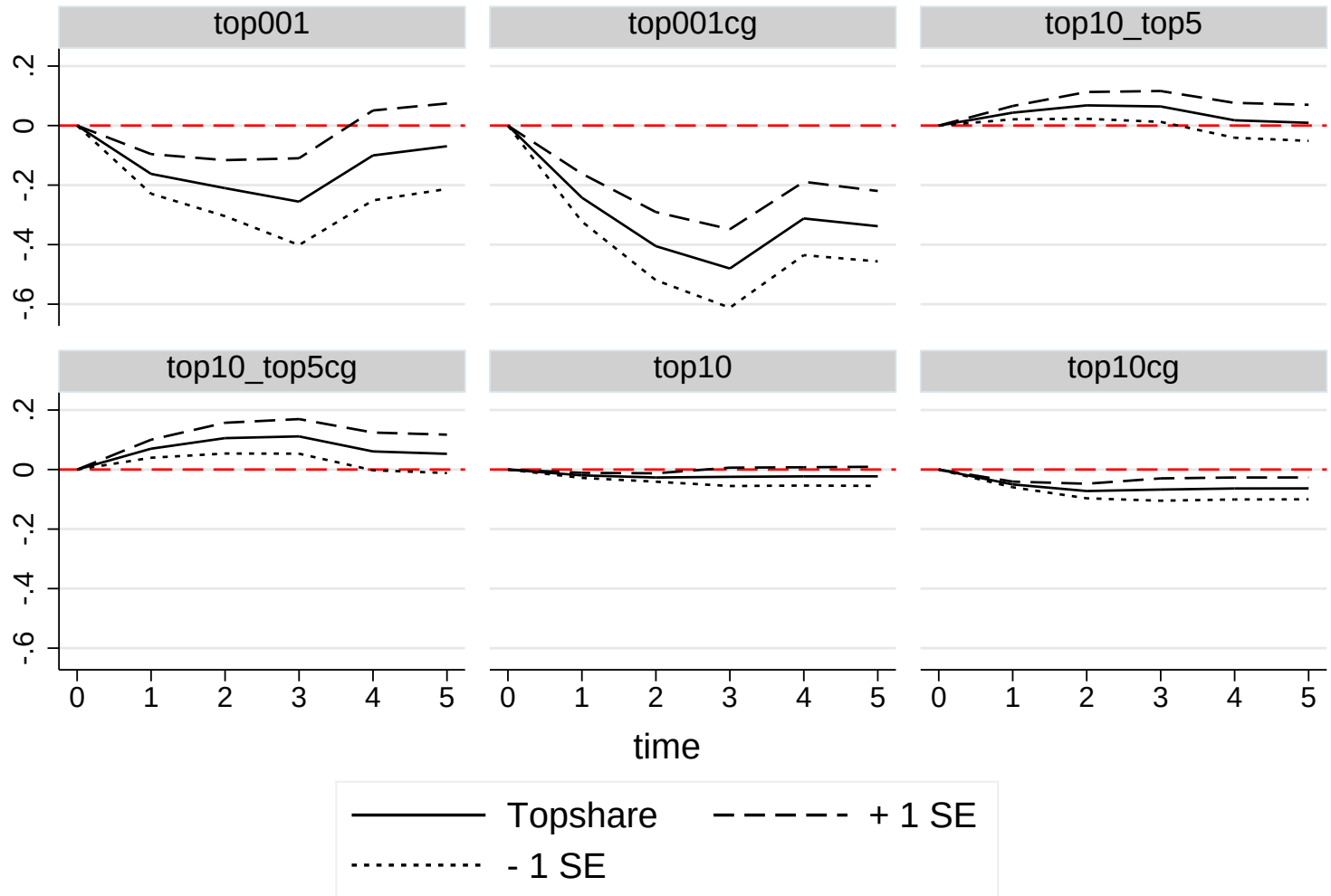


▸ Effect of Stock Market Crashes?

Robustness


0
-.1
-.2
-.3
-.4
percent
0
1
2
3
4
5
years from crisis
controlling for tax changes and average GDP per-capita growth
controlling for marginal tax rates changes
baseline
controlling for 8 lags
assuming crisis lasts for 5 years

IRF - additional controls



Graphs by top income groups

▸ Other robustness A ; ▸ Other robustness B

Conceptual framework

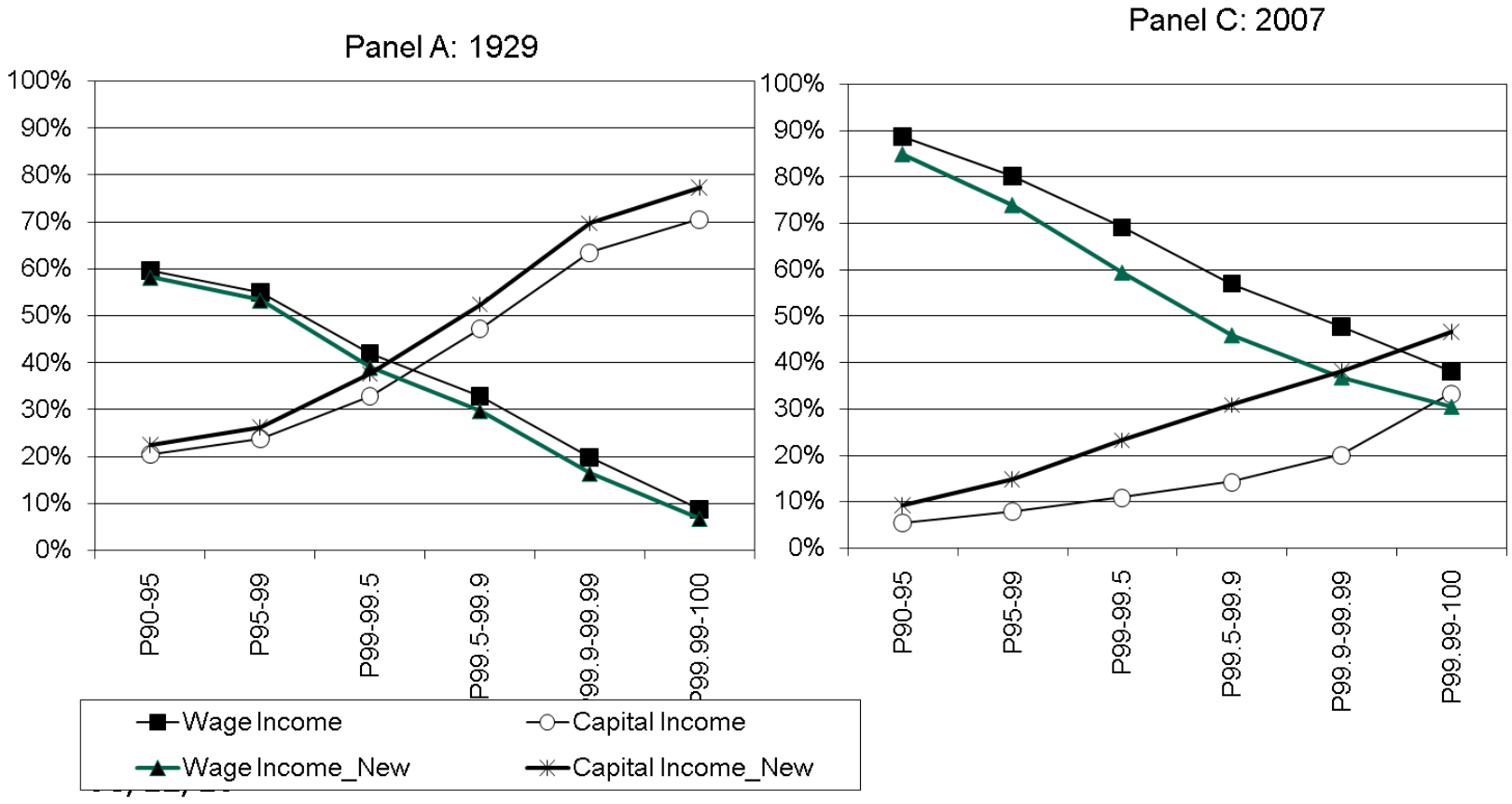
Findings to explain:

1. relative (mild) decline of income shares of richest groups within top decile
2. relative (mild) increase of income shares of "poorer" groups within top decile
3. post-crisis evolution of the shares is not affected much.

Starting point:

$$S_{i,t+1} = S_{i,t} + \lambda(I_i)[S^*_{i,t}(I_i) - S_{i,t}] + \varepsilon_{i,t+1}$$

Capital and Wage Income Share



The adjusted series are calculated by including capital gains income in the definition of capital income.
Share of business income is not represented in the graph.

▸ *"Who are those guys?"*

Table: The Contribution of Different Sources to the Top Income Growth During Banking Crises Episodes

	(1) P90-95	(2) P99.99-100	(3) P90-95(B)	(4) P99.99-100(B)
Wage	0.573^{***}	0.206^{***}	0.489^{***}	0.191^{***}
	(0.107)	(0.042)	(0.08)	(0.038)
Business	0.162^{*}	0.126^{***}	0.258^{***}	0.157^{***}
	(0.077)	(0.031)	(0.051)	(0.024)
Capital	0.263^{***}	0.667^{***}	0.251^{***}	0.651^{***}
	(0.052)	(0.064)	(0.041)	(0.049)
N	32	32	69	69

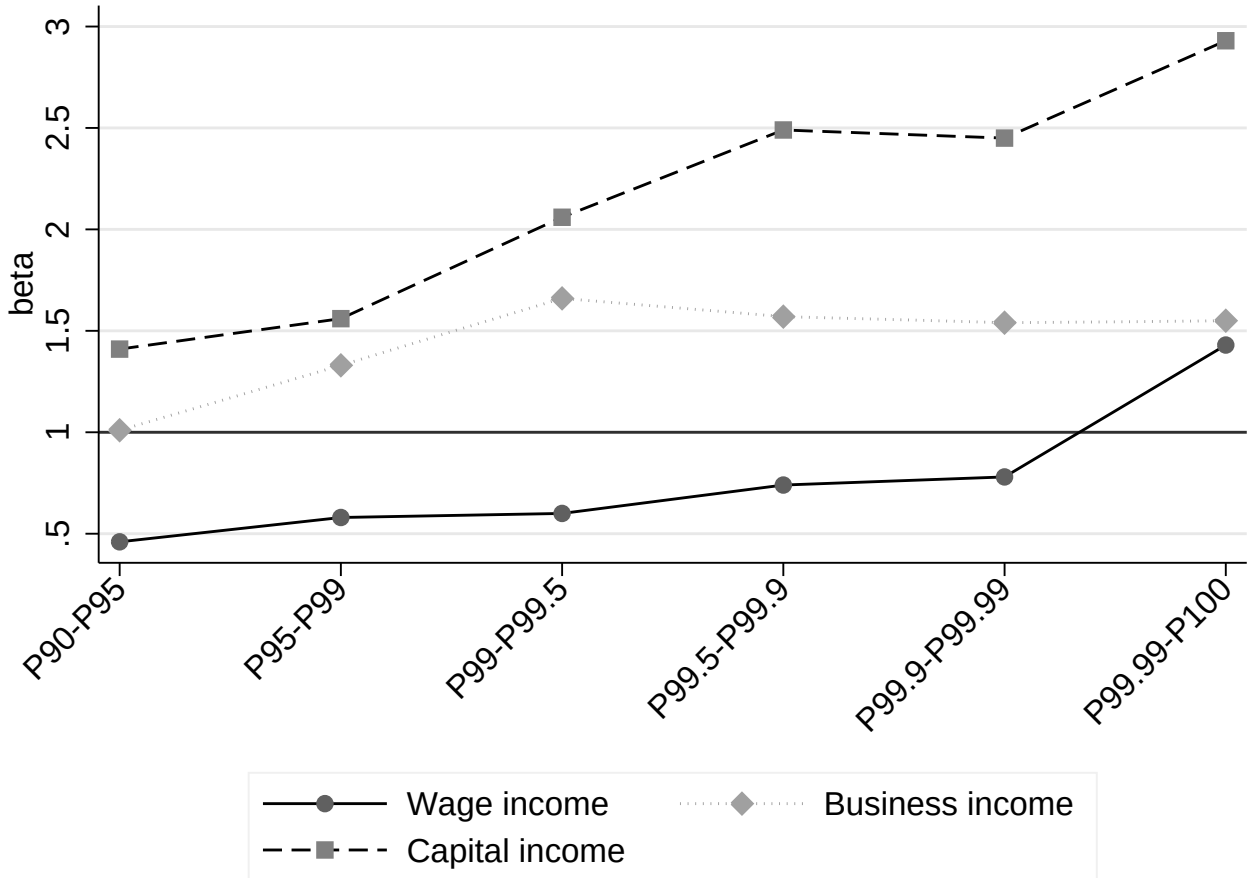
Coefficients obtained through Seemingly Unrelated Regression with the constraint that all the coefficients would sum to one. Capital income includes realised net capital gains. Columns (1) and (2) use sample restricted to the 5-years period around crises episodes. Columns (3) and (4), instead, provide estimates restricted to the three years around stock market crashes episodes. Standard errors are computed with bootstrapping with 100 replications.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

▸ Derive Results

Cyclicality of income sources

The above information could be complemented with the information about the cyclicality of different sources of income at the top.



Beta: elasticity of sources of income to total income. (5 years-window around crises only) W:Wage B:Business C:Capital (including capital gains)

▸ decompose capital income

Explanation of findings

1. Relative increase of Top10-Top5%:
   - Mechanic movements
   - higher job destruction rate and lower job creation rate for low-skilled/low-pay workers

1. Relative decrease of Top0.01%:
   - Incentive contracts + endogenous changes in remuneration timing.
   - Exogenous changes in dividend payments + endogenous re-optimization of portfolios.

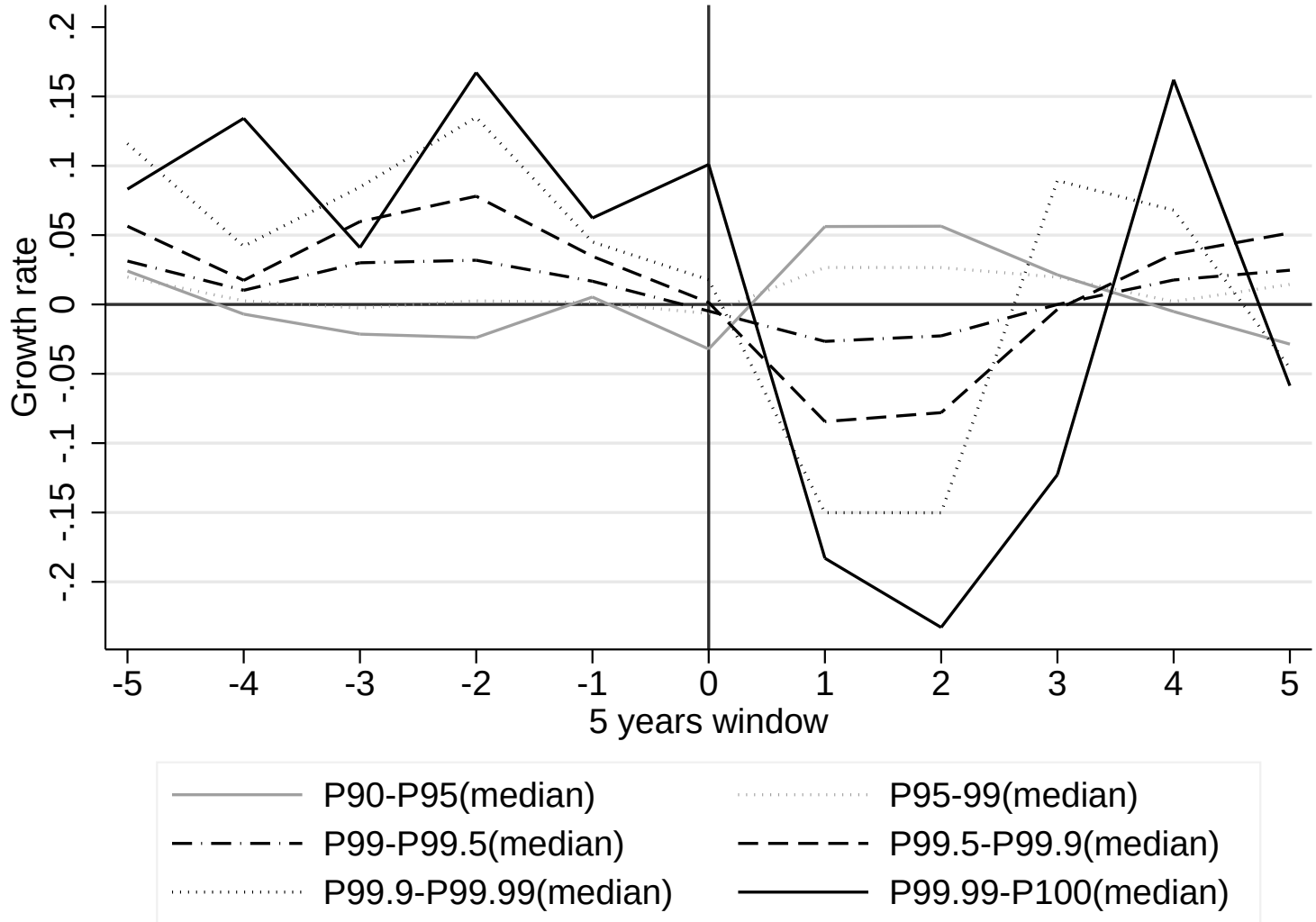
Conclusions (1)

1. Impact of systemic banking crises negative at the very top and positive for the bottom groups of US top decile. Thus, inequality of income within the top decile is reduced ('thickness' of the right tail is reduced) and no systematic response of top decile as a whole.
2. However, the size of the impact is relatively small (and short lived?).
3. Results generally robust to different specifications.

Conclusions (2)

1. Indirect conclusion: Crises are "not structural breaks" for top shares. Consistent with Roine and Waldenstrom (2012), Saez(2012) and Piketty an Saez(2013). "*Downturns per se do not seem to have long run effects on inequality...Great Recession is likely to have a large long run impact only if it is followed by significant policy changes.*"
2. Also consistent with an additional work on 25 different Countries.
3. Note: the work is silent about other important dimensions of individual well-being, including horizontal dimensions of income distribution.

Growth Rates of Top Shares around Crises Episodes



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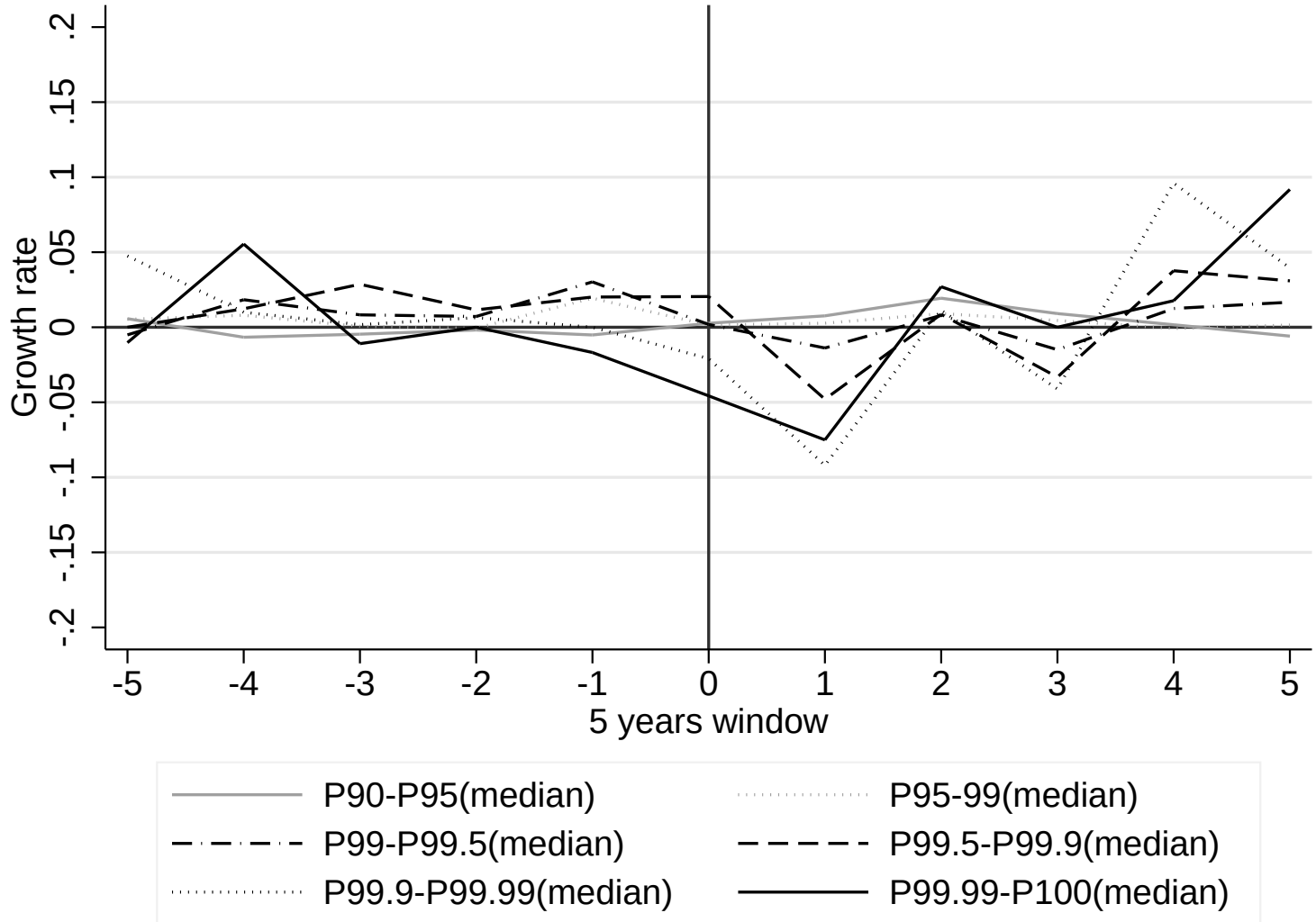
Growth Rates of Top Shares around Stock Market Crashes



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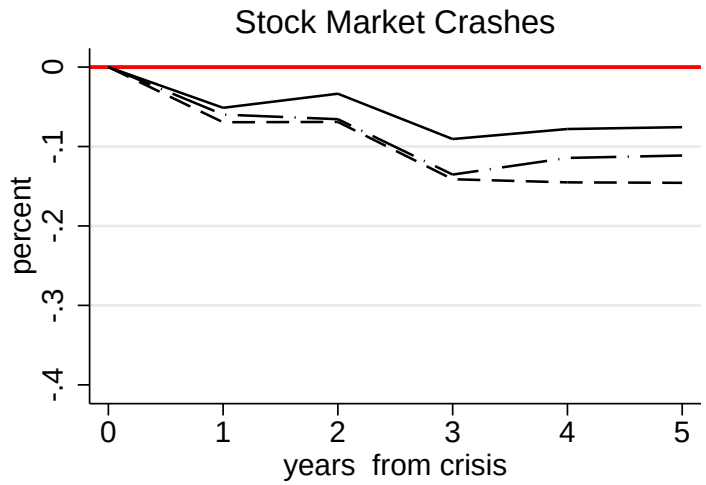
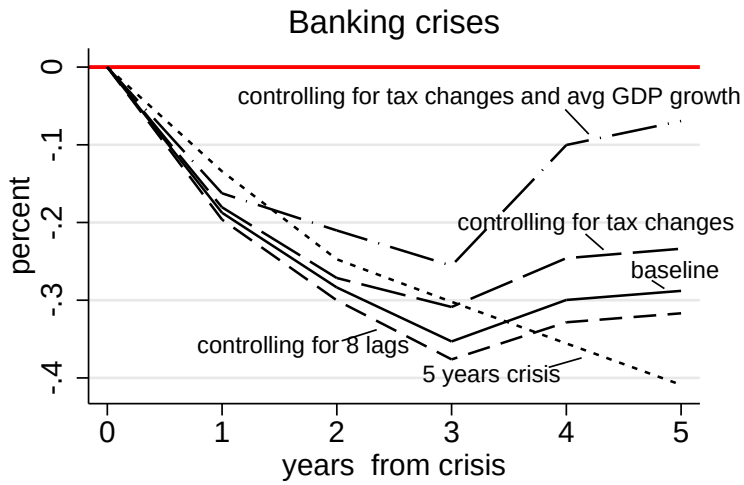
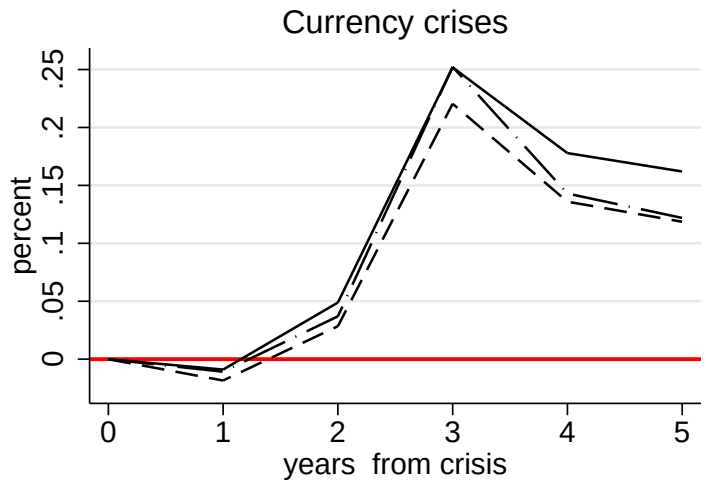
Robustness - additional macro shocks







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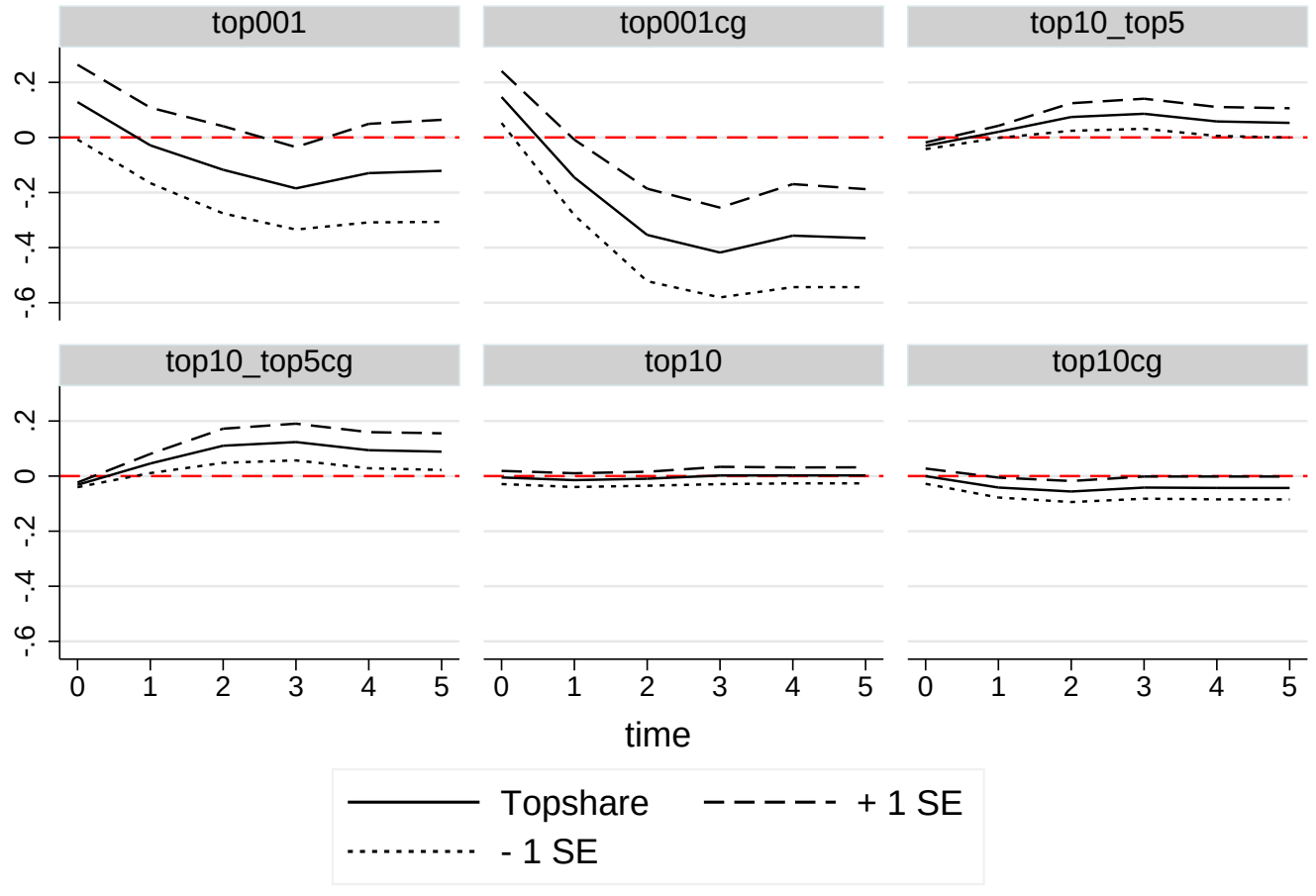
IRF - contemporaneous correlation



Graphs by top income groups

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IRF - stock market crashes and Pareto coefficient

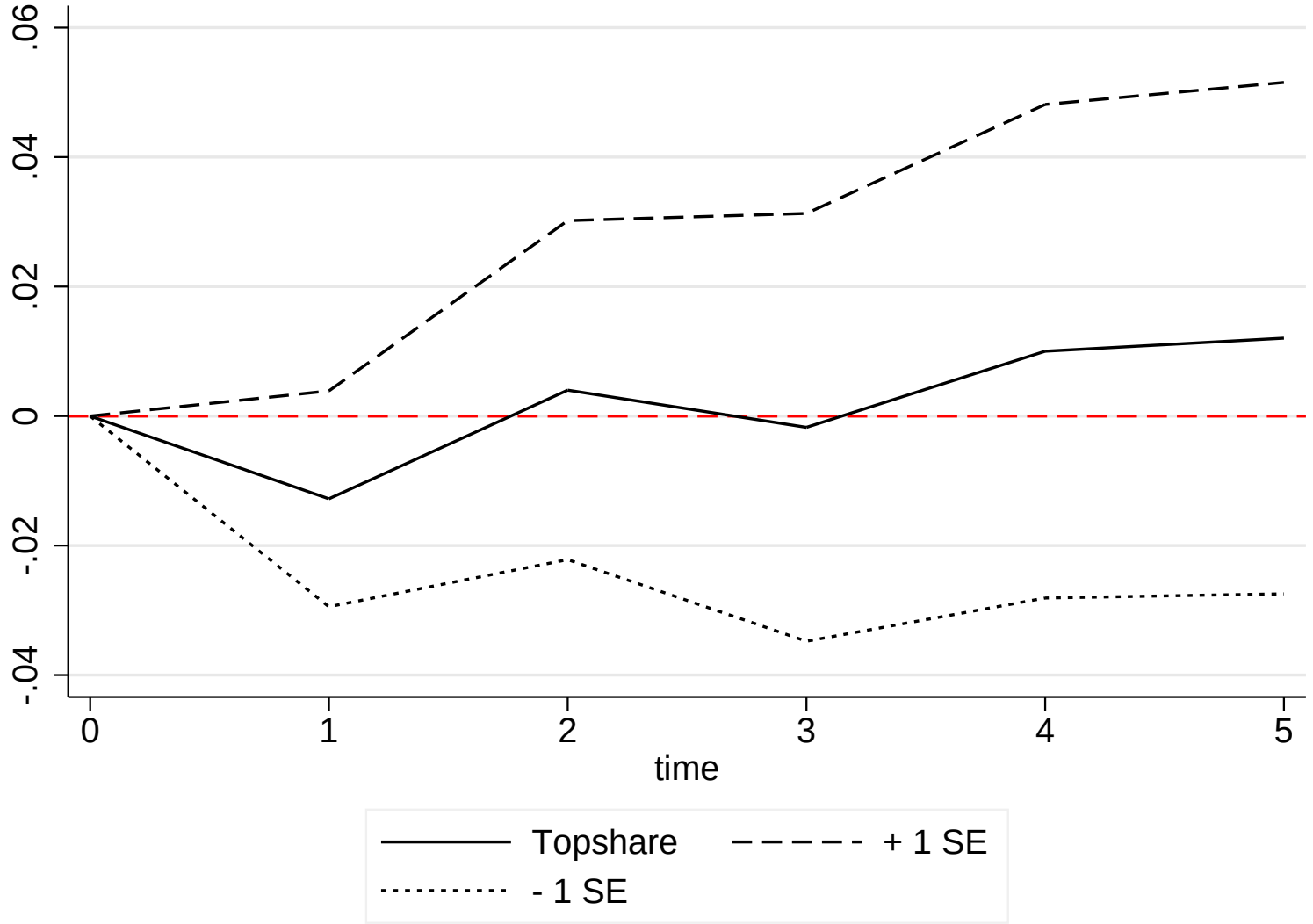

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Table: Descriptive statistics of top income shares data

	Obs	Mean	Sd	Min	Max
Excluding Capital Gains					
Top10%	96	37.95562	5.506918	31.38	48.16
Top10-Top5%	96	11.46896	.8678254	9.65	13.71
Top5-Top1%	96	13.86354	1.441832	11.22	17.13
Top1-Top05%	100	3.3485	.5473174	2.6	4.42
Top05-Top01%	100	4.8092	1.176212	3.18	6.98
Top01-Top001%	100	3.0269	1.262525	1.39	5.87
Top001%	100	1.6565	1.018411	.5	4.4
Including Capital Gains					
Top10%cg	96	39.69125	5.611885	32.31	50.42
Top10-Top5%cg	96	11.24833	.8363287	9.61	13.7
Top5-Top1%cg	96	13.97198	1.316342	11.48	17.32
Top1-Top05%cg	100	3.4805	.521777	2.77	4.54
Top05-Top01%cg	100	5.2143	1.16638	3.47	7.86
Top01-Top001%cg	100	3.5783	1.333436	1.72	6.52
Top001%cg	100	2.3488	1.312298	.85	6.04

ADL Model Estimated for BC and Selected Top Shares

	(1)	(2)	(3)	(4)	(5)	(6)
	Excluding capital gains			Including capital gains		
	top10	top001	top10_top5	top10	top001	top10_top5
L.BC	-0.009	-0.189**	0.057*	-0.041***	-0.275***	0.084*
	(0.006)	(0.057)	(0.028)	(0.008)	(0.079)	(0.036)
L2.BC	0.007	-0.064	0.046	-0.013	-0.261***	0.053*
	(0.015)	(0.050)	(0.028)	(0.019)	(0.069)	(0.027)
L3.BC	0.011	-0.056	0.003	0.015	-0.103	0.004
	(0.015)	(0.055)	(0.010)	(0.017)	(0.089)	(0.014)
L4.BC	-0.001	0.063	-0.029	-0.002	0.045	-0.030
	(0.016)	(0.095)	(0.027)	(0.012)	(0.101)	(0.030)
L.Gtop10	0.156			0.044		
	(0.215)			(0.183)		
L.Gtop001		0.194			-0.157	
		(0.134)			(0.145)	
L.Gtop10_top5			0.184			0.163
			(0.177)			(0.165)
Observations	94	96	94	94	96	94

Newey-West Standard errors in parentheses
The table shows the coefficients of the estimation of the ADL model (**??**) on the growth rate of the top shares. Linear time trend and constant are suppressed from the table
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Impulse response function of selected top shares to BC : excluding capital gains

	(1) top10_G	(2) top10_L	(3) top001_G	(4) top001_L	(5) top10_top5_G	(6) top10_top5_L
I_0	0	0	0	0	0	0
I_1	-0.009	-0.009	-0.189**	-0.189**	0.057*	0.057*
	(0.006)	(0.006)	(0.057)	(0.057)	(0.028)	(0.028)
I_2	0.006	-0.003	-0.101*	-0.289***	0.057+	0.114*
	(0.015)	(0.018)	(0.044)	(0.071)	(0.031)	(0.057)
I_3	0.012	0.009	-0.075	-0.364***	0.014+	0.127*
	(0.017)	(0.031)	(0.051)	(0.095)	(0.008)	(0.061)
I_4	0.001	0.009	0.048	-0.316*	-0.026	0.101+
	(0.015)	(0.030)	(0.093)	(0.145)	(0.026)	(0.060)
I_5	0.000	0.010	0.009	-0.307+	-0.005	0.096
	(0.002)	(0.031)	(0.018)	(0.156)	(0.007)	(0.060)
Observations	94	94	96	96	94	94

Table represents the estimated values of the realizations of the IRFs for the level (L) and the growth rates (G). Standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Impulse response function of selected top shares to BC : including capital gains

	(1) top10_G	(2) top10_L	(3) top001_G	(4) top001_L	(5) top10-top5_G	(6) top10-top5_L
I_0	0	0	0	0	0	0
I_1	-0.041***	-0.041***	-0.275***	-0.275***	0.084*	.084*
	(0.008)	(0.008)	(0.079)	(0.079)	(0.036)	(0.036)
I_2	-0.014	-0.056**	-0.218***	-0.493***	0.067*	0.151*
	(0.017)	(0.018)	(0.053)	(0.099)	(0.030)	(0.062)
I_3	0.014	-0.042	-0.069	-0.562***	0.015	0.166*
	(0.016)	(0.025)	(0.089)	(0.103)	(0.012)	(0.067)
I_4	-0.001	-0.043	0.056	-0.506***	-0.028	0.138*
	(0.011)	(0.026)	(0.108)	(0.126)	(0.029)	(0.066)
I_5	-0.000	-0.043	-0.009	-0.515***	-0.005	0.134*
	(0.001)	(0.026)	(0.017)	(0.115)	(0.007)	(0.066)
Observations	94	94	96	96	94	94

Table represents the estimated values of the realizations of the IRFs for the level (L) and the growth rates (G). Standard errors in parentheses
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Augmented ADL Model Estimated for BC and Selected Top Shares : including changes in marginal tax rates

	(1) top10	(2) top001	(3) top10_top5	(4) top10 CG	(5) top001 CG	(6) top10_top5 CG
L.BC	-0.012	-0.182***	0.057*	-0.045***	-0.268**	0.083*
	(0.009)	(0.053)	(0.028)	(0.006)	(0.084)	(0.036)
L2.BC	0.010	-0.065	0.049+	-0.009	-0.260***	0.057*
	(0.013)	(0.049)	(0.029)	(0.017)	(0.067)	(0.027)
L3.BC	0.014	-0.028	0.010	0.018	-0.053	0.010
	(0.019)	(0.064)	(0.008)	(0.020)	(0.094)	(0.013)
L4.BC	-0.001	0.064	-0.028	-0.002	0.049	-0.030
	(0.016)	(0.094)	(0.027)	(0.012)	(0.097)	(0.030)
Changes in marginal tax rates	0.196**	0.114+	0.378*	0.197*	0.192**	0.335+
	(0.066)	(0.058)	(0.183)	(0.077)	(0.066)	(0.200)
L.Gtop10	0.136			0.047		
	(0.180)			(0.160)		
L.Gtop001		0.168			-0.170	
		(0.13)			(0.141)	
L.Gtop10_top5			0.119			0.108
			(0.130)			(0.125)
Constant	-0.240	-2.446**	0.155	-0.268	-2.760+	0.185
	(0.154)	(0.921)	(0.262)	(0.217)	(1.601)	(0.287)
Observations	94	96	94	94	96	94

Standard errors in parentheses
The table shows the coefficients of the estimation of the augmented ADL model including the log change of the inverse of marginal tax rates: Dlog(1-t).
We assumed contemporaneous incorrelation between crisis and top shares
Linear time trend and constant are suppressed from the table
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Augmented ADL Model Estimated for BC and Selected Top Shares : including changes in marginal tax rates and world per-capita GDP

	(1)	(2)	(3)	(4)	(5)	(6)
	Excluding capital gains			Including capital gains		
	top10	top001	top10_top5	top10	top001	top10_top5
L.BC	-0.019*	-0.162*	0.043+	-0.050***	-0.242**	0.070*
	(0.009)	(0.067)	(0.022)	(0.010)	(0.081)	(0.030)
L2.BC	-0.003	-0.016	0.017	-0.017	-0.200**	0.024
	(0.014)	(0.043)	(0.022)	(0.017)	(0.070)	(0.021)
L3.BC	0.004	-0.036	-0.008	0.007	-0.100	0.000
	(0.024)	(0.087)	(0.017)	(0.026)	(0.093)	(0.017)
L4.BC	0.001	0.164**	-0.046	0.003	0.156***	-0.051+
	(0.023)	(0.062)	(0.028)	(0.016)	(0.037)	(0.029)
Changes in marginal	0.207**	0.074	0.396*	0.207**	0.142*	0.354+
tax rates	(0.064)	(0.059)	(0.172)	(0.077)	(0.070)	(0.189)
average 'world' growth	-0.277*	0.824	-0.568+	-0.210	1.051	-0.555+
in GDP per-capita	(0.121)	(0.528)	(0.287)	(0.188)	(1.038)	(0.306)
L.Gtop10	0.198			0.095		
	(0.194)			(0.188)		
L.Gtop001		0.199			-0.155	
		(0.121)			(0.153)	
L.Gtop10_top5			0.181+			0.161
			(0.102)			(0.099)
Observations	91	93	91	91	93	91

Standard errors in parentheses
The table shows the coefficients of the estimation of the augmented ADL model
including average growth of World real GDP per-capita and the log change of the inverse
of marginal tax rates: Dlog(1-t). We assumed contemporaneous incorrelation between crisis and top shares
Linear time trend and constant are suppressed from the table
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Occupations at the Top

Percentage of primary taxpayers in top 0.1 percent of the distribution of income (including capital gains) that are in each occupation in 2

	Tax return data
Executives, managers, supervisors (non-finance)	40.8
Top non-financial executives, publicly traded firms	
Executive, non-finance, salaried	15.0
Executive, non-finance, closely held business	13.6
Manager, non-finance, salaried	4.7
Manager, non-finance, closely held business	4.6
Supervisor, non-finance, salaried	1.3
Supervisor, non-finance, closely held business	1.7
Financial professions, including management	18.4
Not working or deceased	6.3
Lawyers	6.2
Real estate	4.7
Medical	4.4
Entrepreneur not elsewhere classified	3.6
Arts, media, sports	3.1
Computer, math, engineering, technical (nonfinance)	3.0
Other	2.6
Business operations (nonfinance)	2.2
Skilled sales (except finance or real estate)	1.9
Professors and scientists	1.1
Farmers & ranchers	1.0
Unknown	0.7

Source: Bakija, Cole and Heim (2012)

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Deriving the IRF

We can rewrite g_t^{top} assuming stationarity and only one lag ($\theta_{i,2} = 0$):

$$g_{i,t}^{top} = \sum_{k=0}^{4} \sum_{j=0}^{\infty} \phi_{i,k} \theta_{i,1}^{j} BC_{i,t-k-j} + \sum_{j=0}^{\infty} \theta_{i,1}^{j} \rho_i' X_{i,t-j} + \sum_{j=0}^{\infty} \theta_{i,1}^{j} u_{i,t-j}$$

and derive the IRF realisations of each h year after the crisis:

$$I_{T+h}^{G} = \sum_{k=0}^{4} \sum_{j=k}^{h+k} \phi_{i,k} \theta_{i,1}^{j-k} + \sum_{j=0}^{h} \theta_{i,1}^{j} \rho_i' X_{i,T+h-j} - E_T^0 \left\{ \sum_{j=0}^{h} \theta_{i,1}^{j} \rho_i' X_{i,T+h-j} \right\} + \sum_{j=0}^{h} \theta_{i,1}^{j} u_{i,T+h-j} - E_T^0 \left\{ \sum_{j=0}^{h} \theta_{i,1}^{j} u_{i,T+h-j} \right\}.$$

We further estimate the model with Newey-West SEs and estimate the SEs of IRFs realisations using δ method.

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Top shares decomposition

$$\frac{ds_i}{s_i} \simeq \frac{dy_i}{y_i} - \frac{dY}{Y} = (1 - s_i)[\frac{dy_i}{y_i} - \frac{dY_{-i}}{Y_{-i}}].$$

More information from income decomposition

$$\frac{dy_i}{y_i} = \frac{dW_i}{W_i}\alpha_i^W + \frac{dC_i}{C_i}\alpha_i^C + \frac{dB_i}{B_i}\alpha_i^B.$$

Estimating the incidence of each income source on the growth of top incomes

$$\begin{cases} \frac{\triangle W_{i,t}}{y_{i,t-1}} = \frac{\triangle W_{i,t}}{W_{i,t-1}}\alpha_{i,t-1}^W = a_{i,t}^W + b_{i,t}^W \frac{\triangle y_{i,t}}{y_{i,t-1}} + \varepsilon_{i,t}^W \\ \frac{\triangle C_{i,t}}{y_{i,t-1}} = \frac{\triangle C_{i,t}}{C_{i,t-1}}\alpha_{i,t-1}^C = a_{i,t}^C + b_{i,t}^C \frac{\triangle y_{i,t}}{y_{i,t-1}} + \varepsilon_{i,t}^C \\ \frac{\triangle B_{i,t}}{y_{i,t-1}} = \frac{\triangle B_{i,t}}{B_{i,t-1}}\alpha_{i,t-1}^B = a_{i,t}^B + b_{i,t}^B \frac{\triangle y_{i,t}}{y_{i,t-1}} + \varepsilon_{i,t}^B \end{cases}$$

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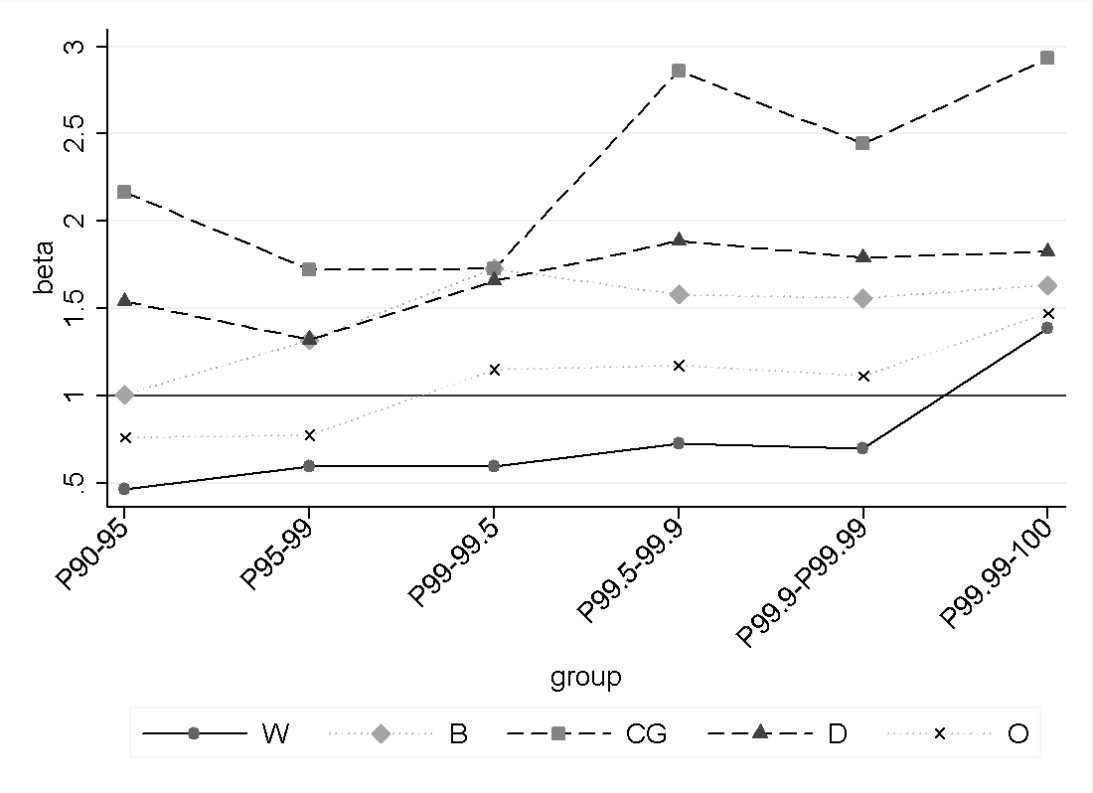
Cyclicality - decompose capital income



Beta: elasticity of sources of income to total income. (5 years-window around crises only) W:Wage B:Business CG:Capital Gains D: Dividends O:Other

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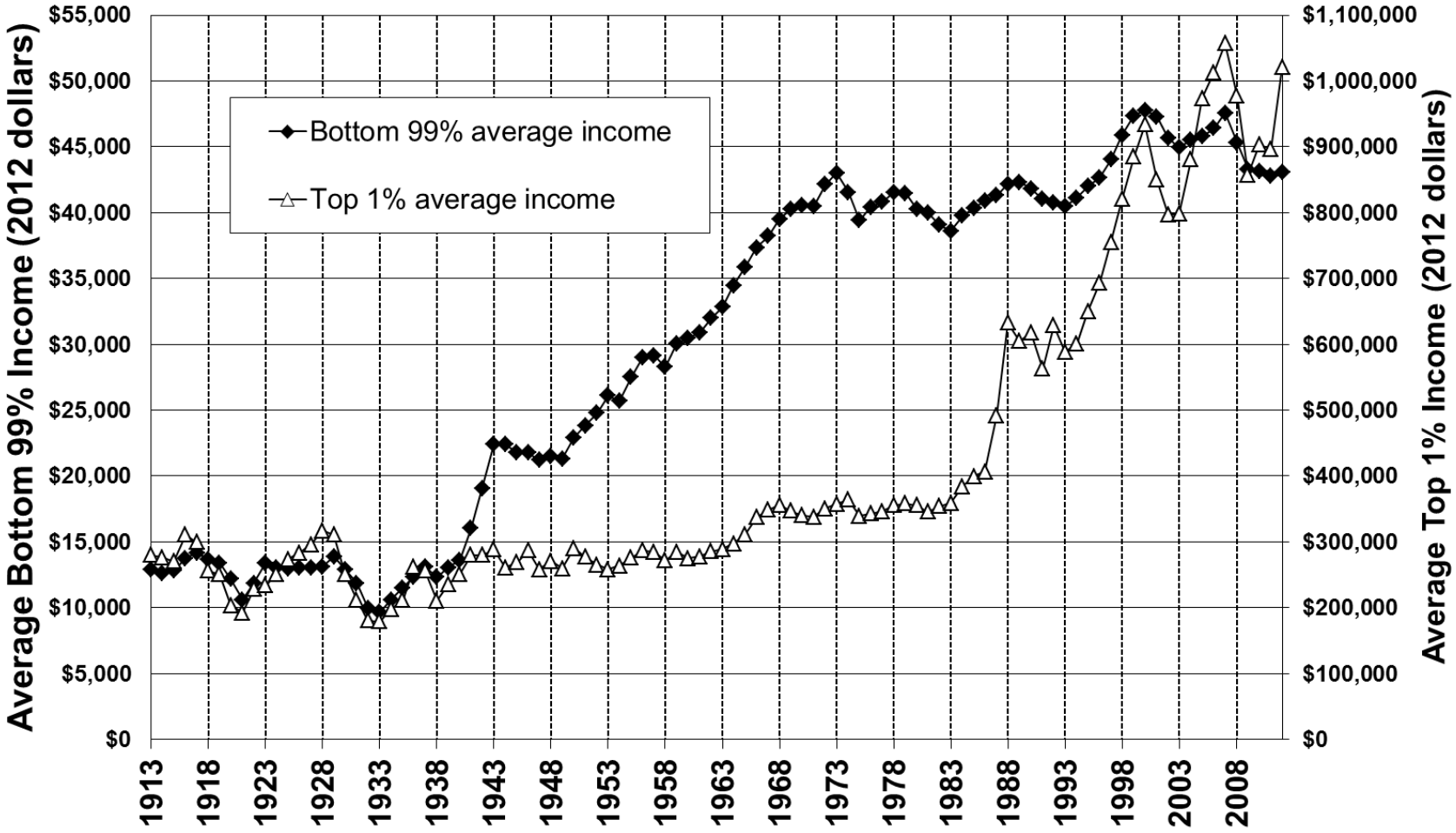
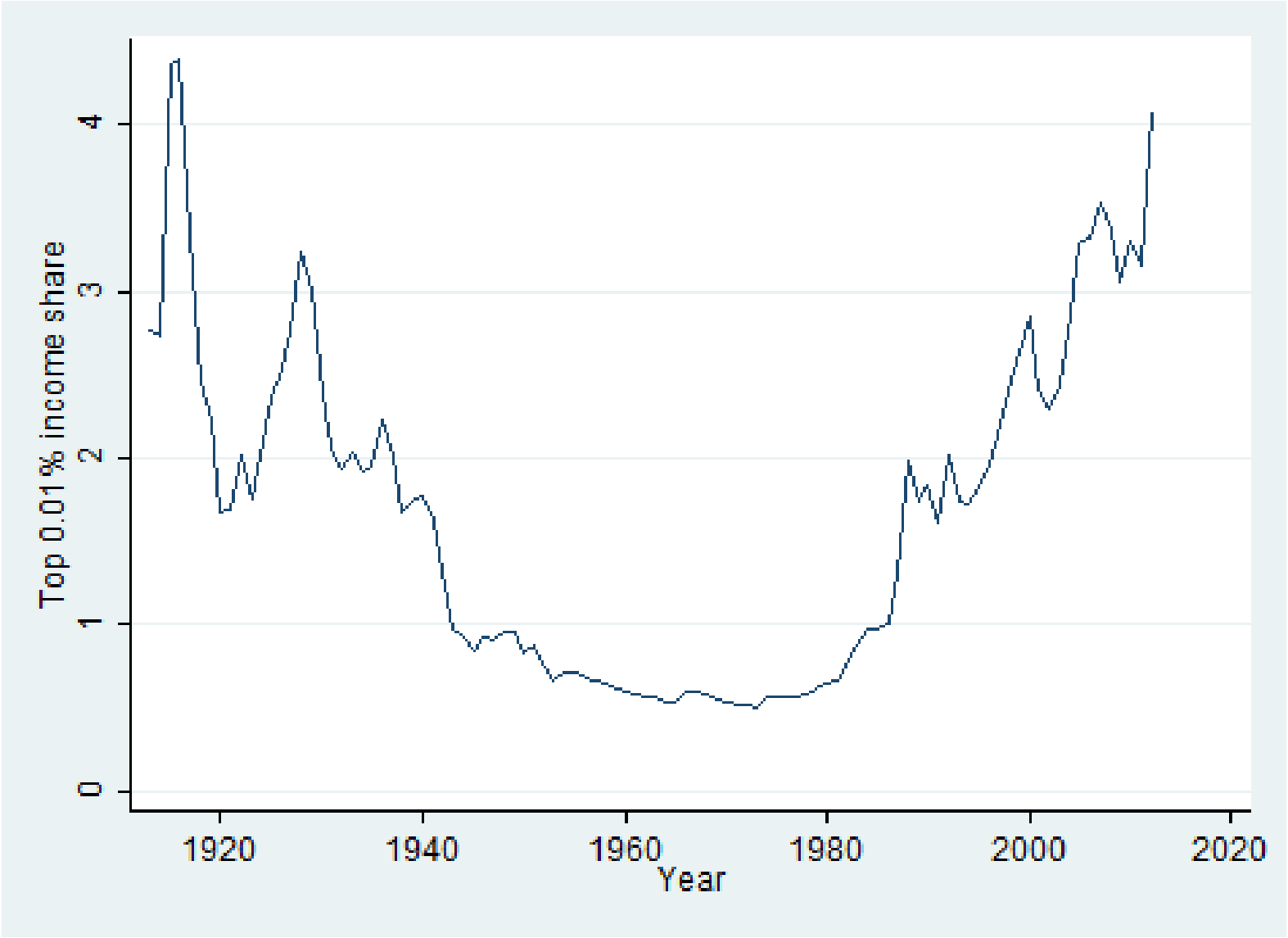
Average incomes 1913-2012



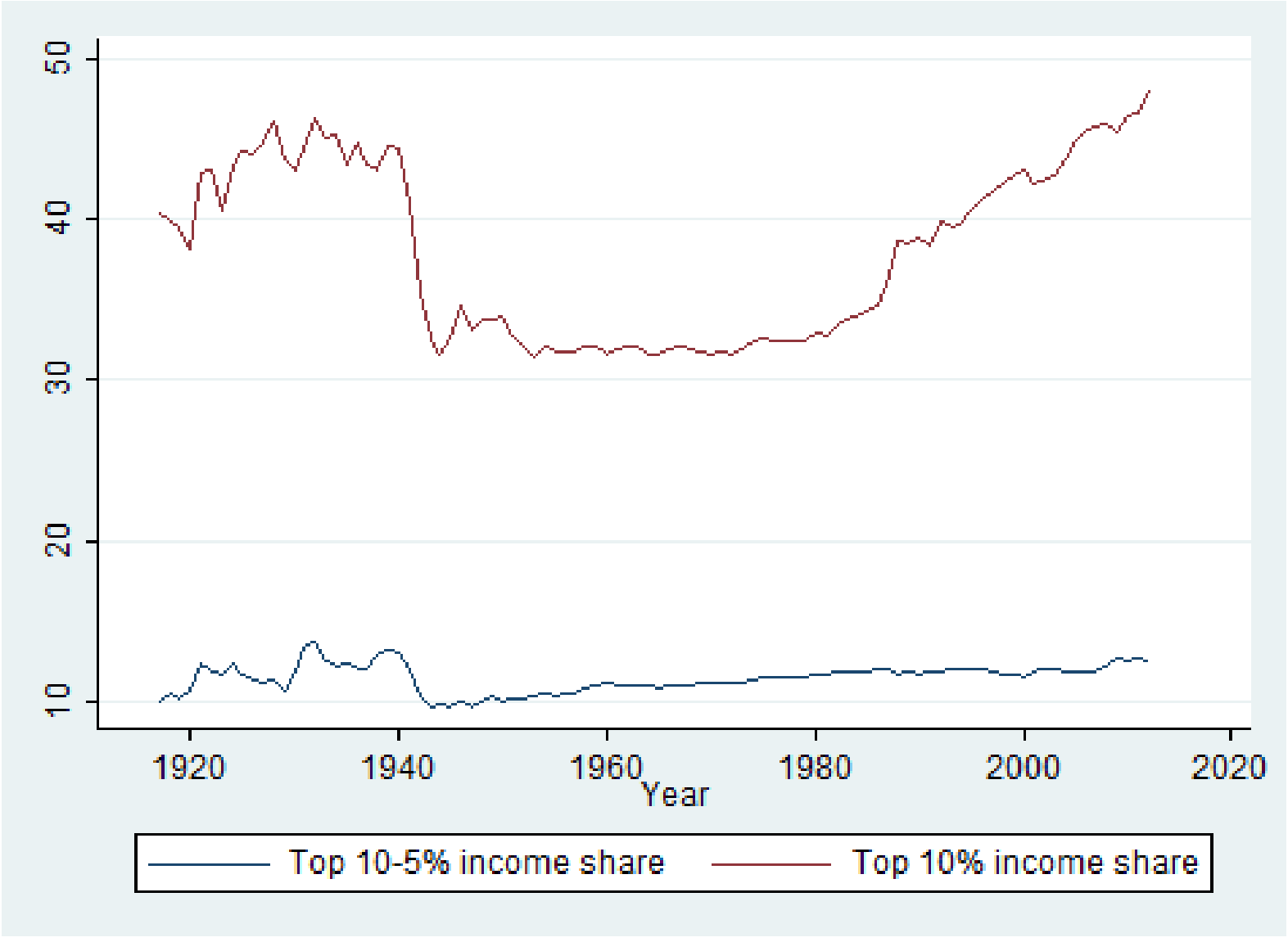
Source: Saez(2013)

Top0.01% 1913-2012



Source: Saez(2013)

Top10 and Top10-Top5% 1913-2012



Source: Saez(2013)