

Sala, Hector

Working Paper

A Fresh Look at Fiscal Redistribution and Inequality in the US across Electoral Cycles

IZA Discussion Papers, No. 11839

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Sala, Hector (2018) : A Fresh Look at Fiscal Redistribution and Inequality in the US across Electoral Cycles, IZA Discussion Papers, No. 11839, Institute of Labor Economics (IZA), Bonn

This Version is available at:

<https://hdl.handle.net/10419/185299>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

DISCUSSION PAPER SERIES

IZA DP No. 11839

**A Fresh Look at Fiscal Redistribution and
Inequality in the US across Electoral Cycles**

Hector Sala

SEPTEMBER 2018

DISCUSSION PAPER SERIES

IZA DP No. 11839

A Fresh Look at Fiscal Redistribution and Inequality in the US across Electoral Cycles

Hector Sala

Universitat Autònoma de Barcelona and IZA

SEPTEMBER 2018

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ABSTRACT

A Fresh Look at Fiscal Redistribution and Inequality in the US across Electoral Cycles*

The evolution of the ratio of direct taxation (characterized by progressive rates) over indirect and payroll taxation (characterized by flat rates) is examined together with its distributional consequences for the Bottom 50%, Middle 40% and Top 10% shares of income. Oscillations of this ratio coincide with the US electoral cycles since the 1960s. We show that periods in which this ratio increases coincide with those in which Democrats rule the government and there is more redistribution from the rich (the Top 10%) to the rest of the population. Conversely, periods in which this ratio falls and Republicans hold the power are characterized by a fall in the ratio and less redistribution from the rich to the rest of the population. Based on a set of counterfactual simulations, we hypothesize that the rich, as informed economic agents, are able to protect themselves against tighter fiscal conditions, thereby curtailing the redistributive effects of enhanced tax progressivity.

JEL Classification: H20, H31, E25

Keywords: electoral cycles, tax composition, income distribution, tax progressivity

Corresponding author:

Hector Sala
Departament d'Economia Aplicada
Universitat Autònoma de Barcelona
08193 Bellaterra
Spain
E-mail: hector.sala@uab.es

* I am grateful to the Spanish Ministry of Economy and Competitiveness for financial support through grant ECO2016-75623-R.

1. Introduction

Piketty *et al.* (2018) have launched a new database on the US Distributional National Accounts (DINA), which is fully consistent with the official National Accounts. This information opens the door to new research on the distributional impact of the government's fiscal policy so far unfeasible from a macroeconomic perspective.

Using this novel information, the empirical analysis in this article complements the vast literature on taxation developed around two axes: (i) taxation and inequality; (ii) taxation and voting behavior (we leave aside related literature, for example on fiscal policy and economic growth, which is not directly relevant to our analysis).¹

With respect to (optimal) taxation and inequality, a core issue is to provide a rationale for progressivity and examine under which conditions income taxes do effectively reduce inequality. This depends essentially on the disincentive effects of taxation and the resulting labor supply responses across individuals and households. In addition, given that political candidates seek to attract as many votes as possible, it is plausible to assume that their decisions, once elected, will reflect to some extent the preferences of the majority. This gives rise to research on the relationship between voting, inequality/redistributive preferences, and taxation outcomes. General appraisals of these strands of literature are provided in Borck (2007), Mankiw *et al.* (2009) and Diamond and Saez (2011), while recent additions can be found in Bierbrauer and Boyer (2016) and Guo and Krause (2018). None of them provide, however, empirical accounts of the distributional impact of the government's fiscal policy across electoral cycles.

In parallel to rising inequality, taxation over the rich is now object of growing attention (Scheve and Stasavage, 2016; Young *et al.*, 2016; Ballard-Rosa *et al.*, 2017; Landier and Plantin, 2017; Hatgioannides *et al.* 2018). Ballard-Rosa *et al.* (2017) provide experimental evidence uncovering changes in redistributive preferences in the presence of high inequality, with direct implications on the perception of high income taxation. They show, in particular, that “conflict over taxation is primarily conflict over taxing the rich” (p. 14). The rich,

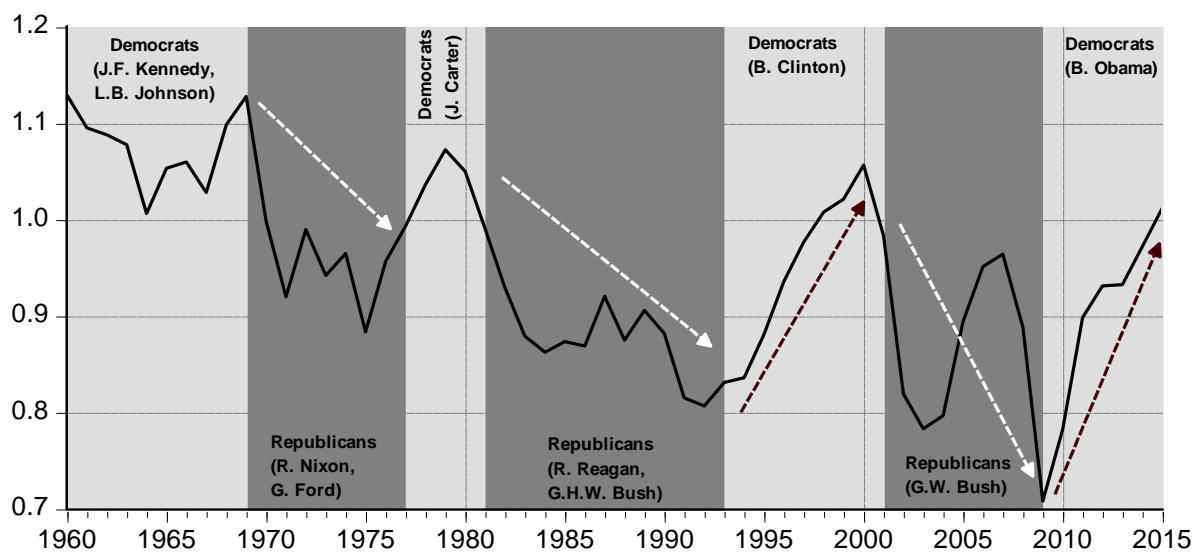
¹ The exception is Romer and Romer (2010), who provide a comprehensive account of the postwar federal tax changes. These tax changes, which involve direct, indirect and payroll taxation, are precisely those underlying the aggregate analysis we propose in this study. As Romer and Romer point out in the complementary material accompanying their article (“A narrative analysis of postwar tax changes”), they “identify every significant piece of federal tax legislation over this period” and “determine the primary motivation for each action, and the size and timing of its revenue effects”.

however, react to tighter fiscal conditions. Within the literature on optimal income taxation, Landier and Plantin (2017) point to sophisticated tax plans and international tax arbitrage as two channels by which affluent households respond to progressive taxation. Young *et al.* (2016) exploit the information of 45 million of tax records to document millionaire tax flight across US states. In this way, millionaire migration comes out as a third channel through which affluent households deal with changes in tax progressivity. In the context of these recent studies, which enhance our understanding of the elusive behavior of the rich vis-à-vis taxation, we provide complementary evidence, by income share quantiles, on the effective redistributive consequences of aggregate changes in fiscal progressivity.

More precisely, the purpose of this paper is to shed new light on the impact of tax composition on income distribution across electoral cycles. By tax composition we point to the ratio of total receipts from direct taxes over total receipts from (i) indirect taxes (taxes on production and income) plus (ii) social security contributions (or payroll taxes). Income distribution refers to the income shares commanded by the Bottom 50% (B50), the Middle 40% (M40), and the Top 10% (T10), which is the only structure of quantiles currently allowed by the data (see Piketty *et al.*, 2018). Finally, by electoral cycle we mean the periods with the same political party holding the Federal government.

The evolution of the Tax composition ratio across electoral cycles is plotted in Figure 1.

Figure 1. Tax composition ratio in the US across electoral cycles.



Source: Author's computation based on OECD data (OECD Economic Outlook No. 101).

We argue that the tax composition ratio depicted in Figure 1 can be considered a useful proxy to track the aggregate evolution of the US tax system progressivity. First, because the numerator contains a tax rate which grows with income and is thus progressive (Mankiw, 2010), while the two components in the denominator contain regressive taxes –i.e. they are characterized by flat rates across income levels.² Second, because the information contained in this ratio is fully representative of the system as a whole –direct, indirect and payroll taxes have accounted for 78%-87% of total government receipts between 1960 and 2016 (equivalent to 23%-29% of the US GDP).

Although such an aggregate appraisal cannot account for fiscal federalism issues (taxation takes place also at a subnational levels), it is still a useful exercise to study the extent to which the overall outcome of the US tax policy influences the widening gap between the poor, the middle class and the rich. In addition, a potential caveat may arise from the political orientation of the Congress, which differs frequently from the presidency (see Table A1 in Appendix). As shown by Farrier (2010), however, the political orientation of the Congress does not preclude the Federal government to implement its desired policies.³ The comprehensive evidence she provides adds up to previous evidence by Sussman and Daynes (1995) —according to which ideology is not the dominant factor in explaining the legislator’s voting behavior—, and Lebo (2008) —showing that monthly congressional and presidential approval data for the 1995-2005 period move in tandem, even during periods of divided government.

Figure 1 is expressive in documenting a twofold pattern. First, a downward trend in progressivity reflected in a 12% fall of the tax composition ratio between 1960 and 2016 (from 1.13 to 0.99). Second, a non-uniform downward path, highly sensitive to political cycles, with recoveries under Democrat governments and relapses under Republican ones.

² Payroll taxes are regressive. Piketty and Saez (2007) explain that the US payroll tax applies only up to a cap and is therefore a relatively smaller tax burden as incomes rise above that cap. See Appendix 1 for more details.

³ The reason is an institutional ambivalence: “In the cycle of ambivalence, Congress forfeits its role in shaping major policies to the president or some other entity that is not necessarily better prepared to see the national interest, void of its own parochial interests or political motives. Members of Congress may hope that oversight or legislative sunset give the institution a reserve of power to address problems that stem from delegation, but it turns out that after-the-fact examination is much more complex than it appears, especially if the executive branch is uncooperative or if vigorous and critical oversight does not make the leap into new law” (Farrier, 2010, p. 3).

Although this evolution is revealing, any particular value of this index should not be considered as especially useful to assess the progressivity of the tax system in a given period. For example, the fact that it takes a unit value in 2016 is not indicative of an aggregate neutrality of the system in that year.

To define the progressivity of the system, we rather resort to the definition provided by Piketty and Saez (2007), which is particularly appealing to our analysis: “(...) a more general definition is that a tax system can be defined as progressive if after tax income is more equally distributed than before tax income, and regressive if after tax income is less equally distributed than before tax income” [Piketty and Saez (2007), p. 5]. It is an appealing definition because under this light the data supplied by Piketty *et al.* (2018) becomes particularly useful: it allows the distinction between the pre-tax and post-tax situation to be applied to the income shares of the B50, M40 and T10 groups with information starting in the 1960s. Hence, the fact that the pre-tax income share of the T10 has been systematically above its post-tax counterpart (as reported in Table 3 below) yields to the conclusion that the US tax system is progressive. This is along the lines of the analysis in Mankiw (2010).⁴

Piketty and Saez (2007) remark, however, that the progressivity of the system since the 1960s has moved in the direction of less progressivity along with the decline of the marginal tax rates on the highest incomes; the reduction of corporate income taxes relative to corporate profits (suggesting that capital owners –who are disproportionately of above-average incomes– earn relatively more net of taxes today than in the 1960s, p. 3); and the substantial increase in payroll tax rates. This fall in progressivity is confirmed by Hatgioannides *et al.* (2018), who further document the rising fiscal inequality since the early 1960s by means of a new Fiscal Inequality Coefficient.

In the context of a fiscal system gradually becoming less progressive, this article provides a twofold contribution to the literature. First, we provide information, *across electoral cycles*, on the global redistribution by income groups achieved through government intervention in the US. Although it is well known that redistribution is a key element in left wing ideology, to the best of our knowledge no quantitative assessment is yet available with such an aggregate and temporal perspective. Second, we estimate how this redistribution

⁴ “It is simply wrong to say we don’t have a progressive tax system. The best analysis shows that average federal tax rates rise steeply with income” [Mankiw (2010), p. 290].

reacts (across income groups) to a key determinant such as the tax composition ratio which, as just argued, can be regarded as a useful aggregate time-series proxy of the falling trend experienced by the progressivity of the US tax system. In doing so, we control for public deficit and debt, so as to focus just on fiscal *composition* effects that modify the progressivity ratio. We also control for GDP growth so that these composition effects can be assessed net of business cycle oscillations.

Controlling for potential imbalances in public accounts allows us to exclude *size* effects derived from expansionary or contractionary fiscal policies that would affect public deficit and public debt. Our analysis, therefore, should be understood as complementary to the dense strand of literature focusing on Keynesian and non-Keynesian effects of the fiscal policy and, in the same vein, to studies that have dealt with the existence of electoral business cycles where public expenditures tend to be the focus of the analysis. We also detach from the presumption that party ideology is innocuous to tax progressivity. Along this line, four different articles were invoked by Herwartz and Theilen (2017) to claim that party ideology has no significant influence on the progressiveness of tax systems. Political parties, so the argument goes, would have given up changes in the tax structure largely because of the pressure brought by the globalization process; and would have progressively focused, instead, on social spending policies to achieve welfare redistribution. Such behavior, in addition, would help to explain why the literature connecting electoral and economic business cycles has tended to focus on the expenditure side of government intervention.

Our findings refute party ideology neutrality and give credit to the alternative view: party ideology matters and affects both fiscal progressivity and redistribution, which evolve along electoral cycles. However, the enhanced progressivity and resulting expected redistribution from the rich to the poor when Democrats hold the power, does not fully counterbalance the lack of redistribution and increased inequality under Republican governments. Moreover, when Democrats govern there is a distributional loss that can be associated to the riches' reaction to cover themselves against tighter fiscal conditions.

The remainder of this paper is structured as follows. Section 2 defines the variables used and presents the estimated models. Section 3 makes use of these models to conduct dynamic simulations and assesses the incidence of tax composition on income distribution. Section 4 concludes.

2. Data and estimation

2.1. Variables

Data on post-tax and pre-tax income shares for the B50, M40 and T10 groups is obtained from Piketty *et al.* (2018). To evaluate how redistributive public action is we subtract these series from one another so as to have a measure of how government intervention affects each of the groups. This is done in the spirit of Solt (2016), who defines the concept of *absolute redistribution* as the difference between market income inequality (pre-tax, pre-transfer) and net income inequality (post-tax, post-transfer), where income inequality is measured by the Gini coefficient.

In our case, given that taxes and transfers have a different impact across groups, we distinguish different measures of redistribution. Two measures of positive redistribution (P_RED^{B50} and P_RED^{M40}) are defined as the post-tax income share of, respectively, the B50 and M40 groups, minus the corresponding pre-tax income shares.⁵ Then, a measure of negative redistribution (N_RED^{T10}) is defined as the pre-tax income share of the T10 minus the corresponding post-tax income share. These two ways of defining redistribution will be useful in the interpretation of the empirical analysis.

Data on tax revenues from direct, indirect and payroll taxation (denoted respectively as DT , IT and PT) is obtained from the OECD Economic Outlook and used to compute the tax composition ratio (TCR) as $TCR = DT/(IT + PT)$. We also gather information on public deficit (P_DEF), defined as government net lending; public debt (P_DEBT), defined as general government net financial liabilities; and Gross Domestic Product (GDP).

Data availability for the variables supplied by Piketty *et al.* (2018) runs from 1962 to 2014. Those from the OECD Economic Outlook run from 1960 to 2016. Given the dynamic nature of the estimated models and the inclusion of instruments the effective sample period becomes 1964-2014.

⁵ Post-tax here is along the lines of Piketty *et al.* (2018). It refers to the situation once the public sector has undertaken all its redistributive action through taxes (all taxes) and spending (all included: cash transfers, in-kind transfers and collective consumption expenditures).

2.2. Models

Provided with these variables, the empirical specifications to be estimated are:

$$\begin{aligned}
 P_RED_t^{B50} = & c_t + \sum_{j=1}^J \alpha_j P_RED_{t-j}^{B50} + \sum_{j=1}^J \beta_j TCR_{t-j} + \sum_{j=0}^J \gamma_j \frac{P_DEF_{t-j}}{GDP_{t-j}} \\
 & + \sum_{j=0}^J \delta_j \frac{P_DEBT_{t-j}}{GDP_{t-j}} + \sum_{j=0}^J \lambda_j \Delta GDP_{t-j} \\
 & + \varepsilon_t
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 P_RED_t^{M40} = & c'_t + \sum_{j=1}^J \alpha'_j P_RED_{t-j}^{M40} + \sum_{j=1}^J \beta'_j TCR_{t-j} + \sum_{j=0}^J \gamma'_j \frac{P_DEF_{t-j}}{GDP_{t-j}} \\
 & + \sum_{j=0}^J \delta'_j \frac{P_DEBT_{t-j}}{GDP_{t-j}} + \sum_{j=0}^J \lambda'_j \Delta GDP_{t-j} \\
 & + \varepsilon'_t
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 N_RED_t^{T10} = & c''_t + \sum_{j=1}^J \alpha''_j P_RED_{t-j}^{T10} + \sum_{j=1}^J \beta''_j TCR_{t-j} + \sum_{j=0}^J \gamma''_j \frac{P_DEF_{t-j}}{GDP_{t-j}} \\
 & + \sum_{j=0}^J \delta''_j \frac{P_DEBT_{t-j}}{GDP_{t-j}} + \sum_{j=0}^J \lambda''_j \Delta GDP_{t-j} \\
 & + \varepsilon''_t
 \end{aligned} \tag{3}$$

where t denotes time and j denotes lags; c is the constant; the α 's, β 's, γ 's, δ 's and λ 's are parameters to be estimated; Δ is the difference operator; and ε is the error term.

Amid the scarce literature empirically connecting redistribution (not inequality) and public policies in a macroeconomic setting, models (1) to (3) resemble those estimated in Battisti and Ziera (2016) in which redistribution is explained by a set of fiscal policy variables. The difference is that Battisti and Ziera (2016) use cross-section and panel data for a wide set of countries, while we focus on a time series analysis.

The estimation process is conducted following the AutoRegressive Distributed Lag

(ARDL) or Bounds Testing Approach (Pesaran and Shin, 1999; and Pesaran *et al.*, 2001). The best functional form is selected according to the standard selection criteria (Akaike, Schwarz) among those specifications that meet the standard misspecification tests (of residual autocorrelation, normality, heteroscedasticity and linearity) and structural stability tests (cusum and cusum²). Such specifications are first estimated by Ordinary Least Squares (OLS). Then, to take into account potential endogeneity and check for the robustness of the estimated economic relationships, we also conduct estimations by the General Method of Moments (GMM) and Two Stages Least Squares (2SLS).

Regarding endogeneity, note that progressivity enters with a lag in all three equations. This is consistent with the lag at which tax payments take place and helps to deal with the potential endogeneity of this crucial variable. In addition, economic growth is considered as endogenous to take into account that it reacts to the fiscal policy. Accordingly, given the time-series nature of our analysis, the selected instruments consist of two lags of the dependent variable, and up to three lags of the explanatory variables progressivity and economic growth (three lags of ΔGDP are included in equation (3) where the second lag enters as explanatory variable).

Our main parameter of interest is β , which captures the short-run influence of the tax composition ratio on redistribution for the B50, M40 and T10 groups. In turn, the corresponding long-run impact (for the B50 group) is given by $\frac{\sum_{j=0}^J \beta_j TCR_{t-j}}{1 - \sum_{j=1}^J \alpha_j P_RED_{t-j}^{B50}}$. The expected outcome is a positive coefficient indicating that, *ceteris paribus*, the larger the aggregate tax progressivity is (as proxied by the tax composition ratio), the more redistribution is achieved. Note that such redistribution is positive for the B50 and M40 groups (as their situation post-tax is better off), while it is negative for the T10 (since they are net contributors to the system). Hence, given the way we have defined redistribution for these three groups, we expect a positive coefficient of β in the three estimated models (this clean expected output justifies the way we have defined the redistribution affecting the different groups).

The *ceteris paribus* assumption is granted by three control variables whose influence is captured by the estimated parameters γ , δ and λ . The first two fix the situation of public accounts and allow the estimate of β to capture solely tax *composition* effects at a given

level of (i) public revenues or expenditures –hence the control by public deficit–; and (ii) net financial liabilities –hence the control by public debt. Estimation of the short and long-run impacts of γ and δ provide, as a by-product, information on *size* effects –i.e. on the influence, on each group, of budget deviations (via lower tax revenues, higher public expenditures, or indebtedness) on redistribution for a given tax composition ratio.

Economic growth aims at controlling for business cycle oscillations, given that being in a rise or a slump conditions the instruments used to conduct the economic policy. As an example, think on the automatic stabilizers which are precisely designed to offset business cycle fluctuations. It is to control for compositional changes in public intervention driven by such oscillations that we also include economic growth. As a by-product, the estimation of λ and its long run impact by group provides valuable information on the segment of population that benefits the most from economic growth.

2.3. Estimates

Table 1 presents the estimated results for equations (1), (2) and (3).

The coefficient on the tax composition ratio is positive and significant for the B90 and the M40 groups. This implies that increases in the proportion of tax revenues obtained from direct taxation (relative to those obtained from indirect taxation and social security contributions) contribute to increase redistribution (the gap between their post-tax and pre-tax income shares widens). The estimated coefficient is also positive for the Top 10%, indicating that further progressivity increases redistribution also for the rich. However, this redistribution is negative in the sense that it erodes the post-tax income shares of the rich relative to their pre-tax situation.

Another important observation is the lower long-run sensitivity of the B50 group to the tax composition ratio (with a long-run coefficient amounting to 0.08) relative to the one of the M40 and T10 groups (which is twice as large when taking as reference the GMM and 2SLS estimates). Given that redistribution only hurts the T10 income shares, we have conducted complementary regressions within this group to check whether we can identify different behaviors at different levels of income. The resulting estimations confirm positive β coefficients, but with decreasing statistical significance. This coefficient is still significant for the Top 5% and Top 1% groups (at 5% and 6% critical values), but it ceases to be

significant at conventional critical values for the Top 0.1%, and becomes irrelevant for the Top 0.001% and Top 0.0001% groups. This implies a behavioral change within the ultra-rich, who become progressively insensitive to changes in fiscal progressivity.

Table 1. Estimates of equations (1), (2) and (3).

	Dependent variable:			Dependent variable:			Dependent variable:		
	$P_RED_t^{B50}$			$P_RED_t^{M40}$			$N_RED_t^{T10}$		
	OLS [E1]	GMM [E2]	2SLS [E3]	OLS [E4]	GMM [E5]	2SLS [E6]	OLS [E7]	GMM [E8]	2SLS [E9]
c	-0.0297*** (0.0068)	-0.0244** (0.0115)	-0.0299*** (0.0105)	-0.0090** (0.0040)	-0.0080* (0.0041)	-0.0090** (0.0040)	0.0229*** (0.0061)	0.0360*** (0.0102)	0.0344** (0.0150)
$P_RED_{t-1}^{B50}$	0.8060*** (0.0397)	0.8335*** (0.0725)	0.8046*** (0.0557)						
$P_RED_{t-1}^{M40}$				0.9304*** (0.0342)	0.9223*** (0.0340)	0.9304*** (0.0342)			
$N_RED_{t-1}^{T10}$							0.9087*** (0.0464)	0.8200*** (0.0940)	0.8259*** (0.1090)
TCR_{t-1}	0.0158*** (0.0046)	0.0126* (0.0069)	0.0159** (0.0064)	0.0111*** (0.0034)	0.0101*** (0.0036)	0.0111*** (0.0034)	-0.0210*** (0.0049)	-0.0261*** (0.0061)	-0.0252*** (0.0708)
$\frac{P_DEF_t}{GDP_t}$	-0.0515*** (0.0191)	-0.0332 (0.0325)	-0.0522* (0.0275)	-0.0547*** (0.0123)	-0.0586*** (0.0106)	-0.0547*** (0.0123)	0.0627** (0.0245)	0.1180*** (0.0417)	0.1123* (0.0635)
$\frac{P_DEBT_t}{GDP_t}$	-0.0034 (0.0024)	-0.0020 (0.0032)	-0.0034 (0.0025)	-0.0086*** (0.0023)	-0.0090*** (0.0016)	-0.0086*** (0.0023)	0.0108** (0.0041)	0.0158*** (0.0059)	0.0154** (0.0071)
ΔGDP_t	0.0622*** (0.0170)	0.0375 (0.0485)	0.0633* (0.0357)				-0.0098 (0.0206)	-0.0872 (0.0565)	-0.0835 (0.0870)
ΔGDP_{t-1}	0.0281* (0.0168)	0.0307** (0.0120)	0.0283* (0.0172)	-0.0095 (0.0125)	-0.0074 (0.0100)	-0.0095 (0.0125)	-0.0098 (0.0200)	-0.0171 (0.0205)	-0.0138 (0.0232)
ΔGDP_{t-2}							0.0458** (0.0189)	0.0266 (0.0184)	0.0288** (0.0291)
$Adj. R^2$	0.9671	0.9650	0.9671	0.9657	0.9651	0.9657	0.9680	0.9577	0.9587
$St. e.$	0.0018	0.0019	0.0018	0.0015	0.0015	0.0015	0.0023	0.0026	0.0026
$Obs.$	51	51	51	51	51	51	51	51	51

Instruments: $P_RED_{t-1}^{B50}$, $P_RED_{t-2}^{B50}$ (or $P_RED_{t-1}^{M40}$, $P_RED_{t-2}^{M40}$; or $N_RED_{t-1}^{T10}$, $N_RED_{t-2}^{T10}$), TCR_{t-1} , TCR_{t-2} , $\frac{P_DEF_t}{GDP_t}$, $\frac{P_DEBT_t}{GDP_t}$, ΔGDP_{t-1} , ΔGDP_{t-2} , and ΔGDP_{t-3} .

Notes: standard errors of regression in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

This finding provides evidence that the rich, who have the means and the incentives,

react to changing fiscal conditions which, as we have seen, vary across electoral cycles.⁶

The situation of public accounts is also relevant for redistribution. The larger the public deficit, the lower is the positive redistribution attained by the B50 and M40 groups. In turn, the negative coefficient for the T10 indicates that the rich benefit from situations in which public deficit rises (a negative sign here implies a reduction in negative redistribution). Within the general relevance of public accounts, there are significant differences across groups, with the B50 much less sensitive to changes in public deficit than the M40 and T10 groups (the long-run elasticity in the first case is -0.27, while for the latter it attains -0.80 and -0.65).

In other words, it is the middle class (to the extent that the M40 is the closest group to this segment of the population) whose favorable redistribution suffers the most when public deficit grows, and the rich who benefit the most from such situation. The same holds with respect to public debt, but at a smaller scale (the corresponding long-run elasticities are not significant for the B50, while they approach -0.10 for the M40 and T10 groups). Since financial difficulties for the public sector lead to government bond issuing and may be associated to bond price increases, this could contribute to explain why the rich are able to benefit from public sector imbalances.

Finally, while economic growth exerts a positive effect on redistribution for the B50 group, it is not significant for the M40 and T10 groups. Given the lower sensitivity of the B50 group with respect to progressivity, this implies that the best mechanism to improve the relative situation of the poor is economic growth (relative, of course, with respect to that of the M40 and T10 groups).

3. The incidence of tax composition on income distribution

The information obtained from the econometric analysis is next used to perform a series

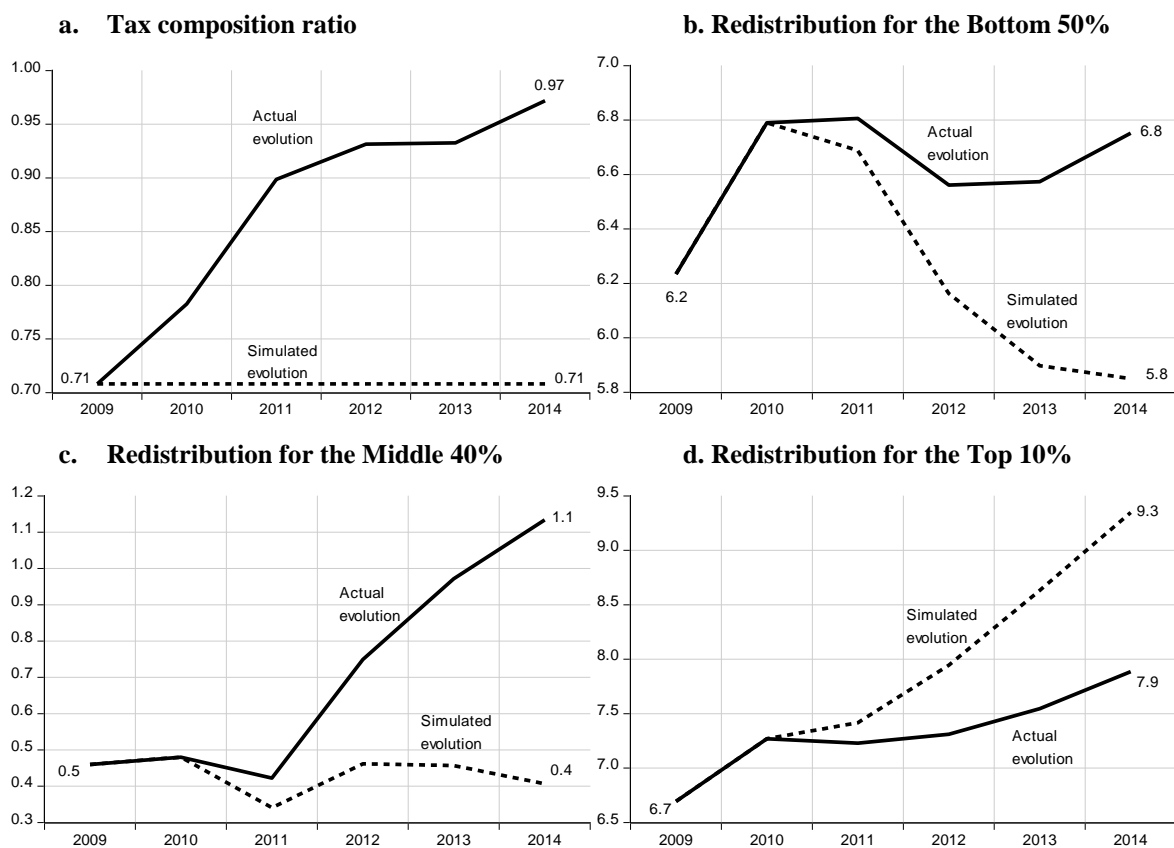
⁶ Landier and Plantin (2017, p. 1187) explain two main forms of tax avoidance: first, “tax plans that shape the timing, nature, and amount of taxable income so as to minimize taxes. Typical schemes consist in relabelling labour income as capital income, or in borrowing against capital gains instead of realizing them to consume. The ability of private equity and hedge fund managers to structure their pay as carried interest, which is taxed as dividends instead of labour income, is a simple example of such avoidance. Sophisticated tax planning involves significant fixed costs associated with the setup of complex legal structures and the remuneration of tax planners’ human capital (...) A second important form of tax avoidance consists in international tax arbitrage, by locating assets or establishing fiscal residence and/or citizenship in low-tax countries. National tax arbitrage through millionaire migration (Young *et al.*, 2016) would be a third form tax avoidance.

of dynamic accounting exercises.

3.1. Obama's administration

As reflected by the steep and steady rise of the tax composition ratio (Fig. 2a), fiscal progressivity increased between 2009 and 2014 (last year in the sample period). Our first exercise assesses to what extent such increase contributed to enhance redistribution from the rich to the poor. For this, we simulate the estimated equations in two scenarios. A first one in which the fiscal composition ratio takes its actual values (continuous line in Fig. 2a), and a counterfactual scenario in which the departing situation is kept unchanged (dashed line in Fig. 2a). The resulting counterfactual trajectories are the dashed ones plotted in Figs. 2b to 2d, which need to be compared to the actual ones (solid lines) in order to grasp the dynamic contributions of the evolution of progressivity in that particular period.

Figure 2. Actual and simulated changes in redistribution.



Note: Redistribution in Figures 2c to 2d is measured as percentage points increases in the post-tax income shares.

Source: Piketty *et al.*'s (2018) for the actual trajectories; simulated paths based on estimated models.

Table 2 provides further information on the actual and simulated changes depicted in Figure 2. While the share of income of the B50 went down by 1.1 pp (from 13.6% to 12.5%), this fall was reduced post-tax to 0.5 pp (from 19.8% to 19.3%). This implies that absolute redistribution increased by 0.6 pp (from 6.2% to 6.8% as plotted in Fig. 2b). Our simulation shows (still Fig. 2b) that in the absence of the increase in progressivity in those years (Fig. 2a), the magnitude of absolute redistribution, which reached 6.8 pp, would have attained 5.8 pp. The difference of 1.0 pp is the extra redistribution achieved in those years due to the increase in the progressivity of the tax composition ratio (in Table 2, this 1 pp. is implicitly reported as the difference between the actual, 0.6, and the counterfactual change, -0.4).

As shown by Table 2, the M40 group evolves along the lines of the B50 group in terms of redistributive changes, which also amount to 0.6 pp (even though the M40 group more than doubles the post-tax income shares of the B50). In the absence of changes in the tax composition ratio, however, redistribution affecting the M40 group would have evolved along a flat path (from 0.5 to 0.4, as shown in Fig. 2c). Hence, the rise in progressivity in 2009-2014 is accountable for 0.7 pp of extra redistribution favoring this group.

Table 2. Income shares and dynamic contributions of progressivity. 2009-2014.

	Bottom 50%			Middle 40%			Top 10%		
	B50P	B50	P.R.	M40P	M40	P.R.	T10	T10P	N.R.
2009	19.8	13.6	6.2	42.5	42.0	0.5	44.4	37.7	6.7
2014	19.3	12.5	6.8	41.6	40.5	1.1	47.0	39.1	7.9
Change	-0.5	-1.1	0.6	-0.9	-1.5	0.6	2.6	1.4	1.2
Counterfactual change			-0.4			-0.1			2.6

Notes: P indicates post-tax; P.R. and N.R. denote, respectively Positive and Negative Redistribution. Source: Piketty *et al.*'s (2018) for the actual values; counterfactual change obtained from simulations based on estimated models.

The share of income of the T10 went up by 2.6 pp during those years (from 44.4% to 47.0%), but was reduced, post-tax, to 1.4 pp (from 37.7% to 39.1%). This implies that absolute redistribution increased by 1.2 pp, from 6.7% to 7.9% (as reported in Table 2 and displayed in Fig. 2d). Our simulation shows that, other things equal, the increase in the tax

composition ratio during those years would have caused the negative redistribution to attain 9.3 pp rather than the actual 7.9 pp (Fig. 2d). The difference of 1.4 pp is the lost distributional impact that would have been achieved in 2009-2014 had the behavioral response of the rich on taxes stayed unchanged in those years. In other words, we ascribe this lost distributional impact to the rich's capacity to react to enhanced fiscal pressure. As discussed before, enhanced access to professional services and advice (relative to the rest of the population) would grant them the capacity to benefit from tax loopholes and tax havens so as to avoid as much as possible unfriendly tax scenarios brought by Democrat governments.

It should be noted that the positive redistribution affecting the B50 and M40 jointly amount to the negative redistribution on the T10 ($6.2+0.5=6.7$ in 2009; $6.8+1.1=7.9$ in 2014). This also holds in terms of changes ($0.6+0.6=1.2$) but with a much balanced distribution (note that both in 2009 and 2014 the B50 group accounts for most of the redistribution from the T10 rents). This implies that under Obama's government, the B50 group did not benefit from the extra redistribution from the rich to the poor in proportion to the existing redistributive pattern.

In addition, our simulations imply that keeping the fiscal conditions as existing in 2009 regarding the aggregate tax composition and agents' behavior would have resulted into a mild loss of redistribution.⁷ This should come as no surprise since keeping the situation unchanged implies reproducing the scenario in the absence of Obama's policies and the rich's reaction to such redistributive policies. More precisely, keeping the scenario unchanged would have caused the B50 and the M40 to loose around 0.4 and 0.1 pp of their post-tax income shares (reported in Table 2 as the counterfactual change), in contrast to the actual 0.6 pp rise that both groups obtained. The rich, in turn, would have experienced a substantial rise in their contribution (of 2.6 pp instead of 1.2 pp) had not covered themselves against increased progressivity.⁸

⁷ The analysis below shows that such mild loss would have been along the lines of the one experienced in the previous Republican period (2000-2008), which is consistent with the assumption of no changes that underlies the simulation.

⁸ The reason why the addition of the impacts on the B50 and M40 do not add up to the one on the T10 is the own nature of the exercise based on econometric estimates. There are differences in the estimated coefficient of the tax composition ratio on redistribution across groups (B50, M40 and T10), but also in the persistence coefficients (those on the lagged dependent variables). This, of course, is reflected in the dynamic simulations and there is no reason why the addition of the simulated impacts should still match. Our method provides insights based on the different behavioral responses of each group and is not a "decomposition" method.

Obama's government was therefore successful in enhancing fiscal progressivity and redistribution from the rich to the poor, but not fully efficient to the extent that the T10 rich managed to escape 1.4 pp of extra negative redistribution.

3.2. Analysis across electoral cycles

Previous electoral cycles show clear differences in the aggregate distributive incidence of the fiscal policy by type of government. Our results, therefore, confirm that party ideology is not innocuous to tax progressivity.

Periods 1968-1976, 1980-1992 and 2000-2008 are characterized by at least two consecutive Republican governments (three in 1980-1992). As reported in Table 3, a common denominator characterizing these three periods is the scarce redistribution from the Top 10% to the rest of the population. It was virtually nonexistent in 1968-1976 (0.1 pp), small in 1980-1992 (0.6 pp), and even favorable to them in 2000-2008 (-0.2 pp). In contrast, the two long periods with Democrats in government (1992-2000 and 2008-2014) saw an increase of 1.7 and 1.2 pp in the share of income that was transferred to the B50 and M40 groups. Under Clinton's presidency, most redistribution accrued to the M40 (1.6 pp), while under Obama's presidency it was symmetrically distributed (recall the 0.6 pp income share gain of the B50 and M40).

Therefore, along the downward path documented for the tax composition ratio in Figure 1, which broadly reflects a steady loss in the redistributive power of the fiscal system, there was a systematic bias towards the concentration of post-tax rents at the highest spectrum of income distribution. This took place at the cost of the income shares of the Bottom 50% (specially) and the Middle 40%.

Although it may seem striking that this two-headed phenomenon (poorer poor and richer rich) has lasted for more than half a century, the analysis by electoral cycles reveals that the compensating action from Democrat governments is actually unable to counterbalance the policies implemented during Republican periods. Such phenomenon, which can be perceived qualitatively by just looking at the fading peaks and troughs of the tax composition ratio across time (Figure 1), is documented quantitatively through our simulations and the resulting counterfactual changes also displayed in Table 3.⁹

⁹ The equivalent to Figure 2 has been produced for the rest of the periods explored (1968-1976; 1976-1980;

Had the fiscal conditions left by L.B. Johnson prevailed between 1968 and 1976, there would have been a significant redistribution from the T10 (-1.4 pp) and the M40 (-0.9 pp, half the actual impact) to the B50 (2.8 pp). By comparing the actual change of the T10 (0.1) to the counterfactual change (-1.4), which is the one that reflects the scenario at the end of Johnson's period, it becomes apparent that this was the group that benefitted the most from Nixon and Ford's governments.

Table 3. Income shares and dynamic contributions of progressivity. 1968-2014.

Bottom 50%			Middle 40%			Top 10%		
B50P	B50	P.R.	M40P	M40	P.R.	T10	T10P	N.R.
Change in 1968-1976:								
1.4	-0.5	1.9	-0.5	1.3	-1.8	-0.8	-0.9	0.1
Counterfactual change:		2.8			-0.9			-1.4
Change in 1976-1980:								
-0.2	-0.3	0.1	0.2	0.5	-0.3	-0.2	0.0	-0.2
Counterfactual change:		-0.1			-0.5			0.4
Change in 1980-1992:								
-3.9	-4.1	0.2	-1.1	-1.5	0.4	5.6	5.0	0.6
Counterfactual change:		1.5			1.8			-1.6
Change in 1992-2000:								
-1.1	-1.2	0.1	-1.3	-2.9	1.6	4.1	2.4	1.7
Counterfactual change:		-0.9			0.8			3.3
Change in 2000-2009:								
-0.8	-1.0	0.2	0.1	0.5	-0.4	0.5	0.7	-0.2
Counterfactual change		1.3			1.0			-2.0

Notes: P indicates post-tax; P.R. and N.R. denote, respectively Positive and Negative Redistribution. Source: Piketty *et al.*'s (2018) for the actual values; counterfactual change obtained from simulations based on estimated models.

The short Democrat period under Carter's presidency (1976-1980) saw no clear trend in

1980-1992; 1992-2000; 2000-2009). Due to space constraints, however, this information has been summarized in Tables 3 and A4 instead of showing these figures.

the tax income ratio. On the contrary, the policies held by Reagan and Bush father's governments kept pushing it down. As reported in Table 3, in the absence of such policies (that is, in the scenario left by J. Carter's administration), the rich would have contributed to rebalance the functional income distribution by reducing their income share by 1.6 pp. The difference is that instead of only the B50 benefiting from such redistribution (by 1.5 pp), the M40 income share would have also benefited (by 1.8 pp). This further evidence confirms that the T10 group benefited systematically from changes in the fiscal rules under the Republican governments of Ford, Nixon, Reagan and Bush father.

Since 1992, Democrats dominated the political scene until Trump's victory in November 2016. Amid many legislation changes, Clinton's mandate saw tax cuts on low-income families and tax increases on the wealthiest. In the absence of such changes, it is interesting to observe that the B50 would have suffered more inequality than they actually did during the roaring nineties. The counterfactual change (or, in other words, the scenario left by Bush son) reveals a net contribution to the system of 0.9 pp, thereby enhancing this group's fall in terms of income share. In contrast, the rich would have contributed much more to redistribution (by 3.3 pp) had they not eluded the more stringent fiscal conditions brought by Clinton's administration. They actually reduced their post-tax share by 1.7 pp, but the model's prediction is that they should have reduced their income shares twice as much, by 3.3 pp. The lost 1.6 pp is to be assigned to the rich's ability to escape enhanced fiscal pressure.

In the next period it was Bush son who held the power. Our simulations for these years indicate that had the fiscal system remained as it was left by Clinton's administration, the rich would have contributed by 2 extra pp to redistribution. Of these, 1.3 pp would have benefited the B50 income's share and 1.0 pp the M40's one. The fiscal policies implemented by Bush son prevented such redistribution to take place, as the actual fall in the T10 income share was reduced to 0.2 pp. The difference between the counterfactual -2 pp versus the actual -0.2 pp is the redistributive cost, in terms of functional income redistribution, of G.W. Bush governments.

In other words, as indicated from our counterfactual analysis, during the last three periods of Republican governments before Trump (28 years overall), the Top 10% benefited from policies that prevented their income share to fall by 5 pp ($= -1.4 - 1.6 - 2.0$). In turn, although Clinton and Obama's administrations implemented policies that could have fully

counterbalanced this fall ($3.3+2.6=5.9$ pp), their actual compensating effect amounted to 1 pp (which is the actual change in redistribution experienced by the T10 group $-0.2+1.2=1.0$ pp). We ascribe the loss in the redistributive power of these policies to the ability of the rich to deal with adverse fiscal conditions using all mechanisms brought by the market liberalization and financial deregulation that started in the 1980s along with the acceleration in economic globalization.

Note that these 5.0 percentage points (either those explained by the policies implemented by the Republican governments, or those not effectively restored under the Democrats administrations) account for 60% of the actual 8.3 pp increase of the income share commanded by the Top 10%.

4. Conclusions

This paper takes a macroeconomic perspective to explore the incidence of tax progressivity on income redistribution. In doing so, it combines time series data on major public account items (different tax receipts, public deficit and public debt) with data on post-tax and pre-tax income distribution from Piketty *et al.*'s (2018) novel database.

Two documented facts set the stage of the analysis. The first one is that the US tax system is progressive (Mankiw, 2010). The second one is that the degree of progressivity shows a secular tendency to weaken (Piketty and Saez, 2007; Hatgioannides *et al.*, 2018). The question we ask in that context is whether, and to what extent, this tendency has affected the redistributive capacity of the fiscal system with regard to the Bottom 50%, Middle 40% and Top 10% income shares.

We find that it has. The B50 have lost 21% of their income share and the M40 close to 10%, while the T10 have increased theirs by 28%. Republicans have shown little interest in redistribution from the rich to the poor (and the middle class), while Democrats have tended to enhance redistribution without succeeding to counterbalance neither the weakening trend in the aggregate progressivity of the fiscal system, nor the falling trend of the B50 and M40 post-tax income shares.

We also find distributional losses that we associate to the rich's capacity to protect themselves, in terms of fiscal exposure, in periods in which tax progressivity augments (and vice-versa). This is plausible to the extent that the rich are not only informed agents, but also

used (and therefore prepared) to deal with changing fiscal rules and opportunities. Opportunities that take place both at the national level –on account of the fiscal changes systematically brought by electoral cycles– and internationally –financial globalization has made it possible to invest internationally in search of enhanced profitability which many times is connected to fiscal benefits.

Given that party ideology will keep determining the redistributive scope of the fiscal policies, it is important to set up mechanisms to avoid distributional losses. For this, extra efforts and international coordination will be needed to restrict the proliferation of tax loopholes and loose access to tax havens.

We suggest two avenues for future research. A first one relates to further disaggregating the responses within the Middle 40% group, which will only be possible whenever new data on the US DINA becomes available. Given that this group displays periods of positive and negative redistribution, further disaggregation would shed light on the income decile after which redistribution becomes unanimously negative. A second one is to investigate, along the lines of Alstadsæter *et al.* (2017) for the Scandinavian countries, fiscal behavioral changes when inequality increases; especially within the richer US Top 10% when confronted to changing fiscal conditions.

References

- Alstadsæter, A., N. Johannesen, and G. Zucman (2017): “Tax Evasion and Inequality”, *NBER Working Paper No. 23772*, NBER, Massachusetts: Cambridge.
- Ballard-Rosa, C., L. Martin, and K. Scheve (2017): “The Structure of American Income Tax Policy Preferences”, *The Journal of Politics*, 79 (1), pp. 1-16.
- Battisti, M. and J. Zeira (2016): “The Effects of Fiscal Redistribution” in K. Basu and J.E. Stiglitz (Eds.) *Inequality and Growth: Patterns and Policy*, Vol. 1: Concepts and Analysis, pp. 201-224, New York: Palgrave Macmillan.
- Bierbrauer, F.J. and P.C. Boyer (2016): “Efficiency, Welfare, and Political Competition”, *The Quarterly Journal of Economics*, 131 (1), pp. 461–518.
- Borck, R. (2007): “Voting, inequality and redistribution”, *Journal of Economic Surveys*, 21 (1), pp. 90-109.
- Diamond, P., and E. Saez (2011): “The Case for a Progressive Tax: From Basic Research to Policy Recommendations”, *Journal of Economic Perspectives*, 25 (4), pp. 165-190.
- Ferrier, J. (2010): *Congressional Ambivalence: The Political Burdens of Constitutional Authority*, The University Press of Kentucky, Kentucky.
- Guo, J.T. and A. Krause (2018): “Changing social preferences and optimal redistributive taxation”, *Oxford Economic Papers*, 70 (1), pp. 73-92.
- Herwartza, H., and B. Theilen (2017): “Ideology and redistribution through public spending”,

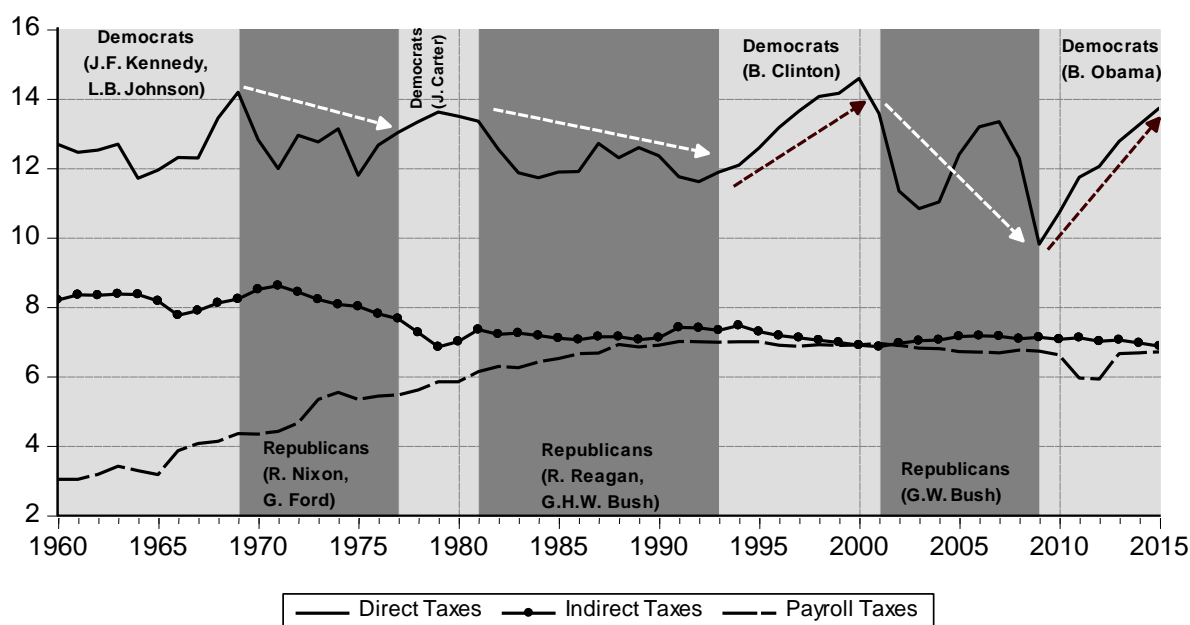
- European Journal of Political Economy*, 46, pp. 74–90.
- Hatgioannides, J., M. Karanassou, and H. Sala (2018): “Should the Rich be Taxed More? The Fiscal Inequality Coefficient”, *Journal of Economic Issues*, In Press.
- Landier, A. and G. Plantin (2017): “Taxing the Rich”, *Review of Economic Studies*, 84, pp. 1186-1209.
- Lebo, M.J. (2008): “Divided Government, United Approval: The Dynamics of Congressional and Presidential Approval” *Congress & the Presidency*, 35 (2), pp. 1-16.
- Mankiw, G.N. (2010): “Spreading the Wealth Around: Reflections Inspired by Joe the Plumber”, *Eastern Economic Journal*, 36, pp. 285-298.
- Mankiw, G.N., M.C. Weinzierl, and D. Yagan (2009): “Optimal Taxation in Theory and Practice”, *Journal of Economic Perspectives*, 23 (4), pp. 147–174.
- Pesaran, M.H. and Y. Shin (1999): “An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis” in *Econometrics and Economic Theory in the Twentieth Century: The Ragnar Frisch Centennial Symposium*, edited by Strom, S., Cambridge University Press, pp. 371-413.
- Pesaran, M.H., Y. Shin, and Smith, R.J. (2001): “Bounds testing approaches to the analysis of level relationships”, *Journal of Applied Econometrics*, 16, pp. 289-326.
- Piketty, T. and E. Saez, (2007): “How Progressive is the U.S. Federal Tax System? A Historical and International Perspective”, *Journal of Economic Perspectives*, 21 (1), pp. 3-24.
- Piketty, T., E. Saez, and G. Zucman (2018): “Distributional National Accounts: Methods and Estimates for the United States”, *Quarterly Journal of Economics*, 133 (2), pp. 553-609.
- Romer, C.D. and D.H. Romer (2010): “The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks”, *American Economic Review*, 100 (2), PP. 763–801.
- Solt, F. (2016): “The Standardized World Income Inequality Database”, *Social Science Quarterly*, 97(5), pp. 1267-1281.
- Scheve, K. and D. Stasavage (2016): *Taxing the Rich: A History of Fiscal Fairness in the United States and Europe*, Princeton University Press: Princeton.
- Sussman, G. and B.W. Daynes (1995): “The Impact of Political Ideology on Congressional Support for Presidential Policy Making Authority: The Case of the Fast Track”, *Congress & the Presidency*, 22 (2), pp. 141-153.
- Young, C., C. Varner, I.Z. Lurie, and R. Prisinzano (2016): “Millionaire Migration and Taxation of the Elite: Evidence from Administrative Data”, *American Sociological Review*, 81(3), pp. 421–446.

APPENDICES

A1. Components of the Tax composition ratio.

Figure A1 complements Figure 1 by plotting the trajectories of the three components in the tax composition ratio expressed as percent of GDP. Direct taxation oscillates across electoral cycles by growing under Democrats presidents and falling under Republicans presidents. Indirect taxation has evolved from above 8% in the sixties and early seventies, to around 7% subsequently. Payroll taxes have more than doubled from 3% in the early sixties to stabilize not far from 7% since the nineties.¹⁰ In view of these trajectories, most of the variability in the Tax composition ratio should be ascribed to the numerator.

Figure A1. Components of the Tax composition ratio. Percent of GDP.



Source: Author's computation based on OECD data (OECD Economic Outlook No. 101).

¹⁰ In 1960, the OASDI (Old Age, Survivors and Disability Insurance) tax rate was 6.0% and there was no Medicare tax rate. In 1966, the former had risen to 7.7%, while the latter was implemented for the first time (0.7%). Both rates were augmented subsequently until 1986 and 1990 when they reached their current values (in 2018) of 2.9% the Medicare tax rate, and 12.4% the OASDI tax rate. This explains the stabilization of payroll taxes since the nineties. Note, in addition, that these flat rates together with the ceiling imposed by the maximum earnings taxed give payroll taxation its regressive character.

A2. Political orientation of the Congress

Legislation changing the tax code is processed at the US Congress which consists of two chambers: the Senate, with 100 senators, and the House of Representatives, with 435 Representatives. Table A1 shows that for more than three decades (between the 86th and 103rd Congresses) there was a Democrat majority in the Congress. Since then there has been a Republican majority with the exception of the 110th and 111th Congresses.

Table A2. Political dominance in the US Congress. 1969-2017.

Congress	Years	Total	Democrats	Republicans	Others	Vacant	President
86th	1959-1961	534	347	187	0	0	Democrat
87th	1961-1963	537	326	211	0	0	Democrat
88th	1963-1965	535	325	209	0	1	Democrat
89th	1965-1967	535	363	172	0	0	Democrat
90th	1967-1969	535	312	223	0	0	Democrat
91st	1969-1971	535	301	234	0	0	Republican
92nd	1971-1973	535	309	224	2	0	Republican
93rd	1973-1975	535	298	234	3	0	Republican
94th	1975-1977	535	352	181	2	0	Republican
95th	1977-1979	535	353	181	1	0	Democrat
96th	1979-1981	535	335	199	1	0	Democrat
97th	1981-1983	535	288	245	2	0	Republican
98th	1983-1985	535	315	220	0	0	Republican
99th	1985-1987	535	300	235	0	0	Republican
100th	1987-1989	535	313	222	0	0	Republican
101st	1989-1991	535	315	220	0	0	Republican
102nd	1991-1993	535	323	211	1	0	Republican
103rd	1993-1995	535	315	219	1	0	Democrat
104th	1995-1997	535	252	282	1	0	Democrat
105th	1997-1999	535	252	281	2	0	Democrat
106th	1999-2001	535	256	278	1	0	Democrat
107th	2001-2003	535	262	271	2	0	Republican
108th	2003-2005	535	253	280	2	0	Republican
109th	2005-2007	535	246	286	2	1	Republican
110th	2007-2009	535	282	247	2	4	Republican
111th	2009-2011	537	313	219	2	3	Democrat
112th	2011-2013	535	244	289	2	0	Democrat
113th	2013-2015	535	255	279	1	0	Democrat
114th	2015-2017	535	232	300	2	1	Republican

Source: Author's elaboration based on data from the US House of Representatives (Office of the Clerk).

A3. Alternative estimates

Table A3 provides alternative OLS estimates of equations [1], [2] and [3] than the ones presented in Table 1. We abstain from instrumental variable methods to (avoid noise from changes in the set of instruments and) allow a direct comparison of results.

Table A3. Alternative estimates. OLS.

	Dependent variable: $P_RED_t^{B50}$			Dependent variable: $P_RED_t^{M40}$			Dependent variable: $N_RED_t^{T10}$		
	[E1]	[E1']	[E1'']	[E4]	[E4']	[E4'']	[E7]	[E7']	[E7'']
c	-0.0297*** (0.0068)	-0.0231* (0.0120)	-0.0381*** (0.0127)	-0.0090** (0.0040)	-0.0123** (0.0060)	-0.0221*** (0.0066)	0.0229*** (0.0061)	0.0355*** (0.0120)	0.0601*** (0.0139)
$P_RED_{t-1}^{B50}$	0.8060*** (0.0397)	0.8383*** (0.0526)	0.8342*** (0.0537)						
$P_RED_{t-1}^{M40}$				0.9304*** (0.0342)	0.9028*** (0.0342)	0.9043*** (0.0341)			
$N_RED_{t-1}^{T10}$							0.9087*** (0.0464)	0.9466*** (0.0442)	0.9429*** (0.0443)
TCR_{t-1}	0.0158*** (0.0046)		0.0151*** (0.0047)	0.0111*** (0.0034)		0.0097*** (0.0033)	-0.0210*** (0.0049)		-0.0240*** (0.0046)
DT_{t-1}		0.1482*** (0.0524)			0.1222*** (0.0297)			-0.2958*** (0.0582)	
$IT_{t-1} + PT_{t-1}$		-0.0723 (0.0625)			-0.0165 (0.0356)			0.0567 (0.0472)	
$\frac{P_DEF_t}{GDP_t}$	-0.0515*** (0.0191)	-0.0603*** (0.0222)	-0.0606*** (0.0224)	-0.0547*** (0.0123)	-0.0710*** (0.0135)	-0.0712*** (0.0135)	0.0627** (0.0245)	0.1061*** (0.0270)	0.1074*** (0.0272)
$\frac{P_DEBT_t}{GDP_t}$	-0.0034 (0.0024)	-0.0024 (0.0027)	-0.0026 (0.0027)	-0.0086*** (0.0023)	-0.0098*** (0.0023)	-0.0097*** (0.0022)	0.0108** (0.0041)	0.0079** (0.0039)	0.0082** (0.0039)
ΔGDP_t	0.0622*** (0.0170)	0.0686*** (0.0190)	0.0690*** (0.0192)				-0.0098 (0.0206)	-0.0464** (0.0226)	-0.04761** (0.0227)
ΔGDP_{t-1}	0.0281* (0.0168)	0.0300* (0.0170)	0.0302* (0.0170)	-0.0095 (0.0125)	0.0028 (0.0129)	0.0027 (0.0129)	-0.0098 (0.0200)	-0.0264 (0.0193)	-0.0267 (0.0193)
ΔGDP_{t-2}							0.0458** (0.0189)	0.0419*** (0.0174)	0.0423** (0.0175)
F_PR_{t-1}			0.0369 (0.0471)			0.0531*** (0.0217)			-0.1210*** (0.0412)
$Adj. R^2$	0.9671	0.9671	0.9668	0.9657	0.9689	0.9691	0.9680	0.9730	0.9728
$St. e.$	0.0018	0.0018	0.0019	0.0015	0.0015	0.0015	0.0023	0.0021	0.0021
$Obs.$	51	51	51	51	51	51	51	51	51

Notes: standard errors of regression in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

The first alternative substitutes the Tax composition ratio by its numerator (DT_t) and denominator ($IT_t + PT_t$), which are introduced as separate controls in models [E1'], [E4'] and [E7']. The three variables (DT ; IT ; PT) are expressed as percent of GDP. Direct taxation, which is characterized by its variability (Figure A1), is fully significant in the three models, in contrast to indirect and payroll taxes. Direct taxation, therefore, appears as a key driving factor of the overall progressivity of the system.

The second alternative includes fiscal pressure ($F_{PR}_t = DT_t + IT_t + PT_t$) as an additional control. Hence, beyond controlling for public deficit and debt, we impose a further restriction so that the overall level of taxation is kept constant. All three estimated models, [E1''], [E4''] and [E7''], deliver a common picture in which the estimated coefficient of the Tax composition ratio is fully robust. In addition, we observe that this additional control is not significant to explain redistribution affecting the B50 income shares, but it is so in terms of the M40 and T10 ones. Thus, for a given level of overall progressivity (TCR is a control in the regression), more fiscal pressure benefits the M40 and T10 income shares, but not the poor. The fact that a higher level of fiscal pressure with no further progressivity reduces the negative redistribution affecting the T10 income shares points to the ability of these rents to scape taxes, as documented in Young *et al.* (2016) and Landier and Plantin (2017).

A4. Redistributive patterns

Table A4 shows that across electoral cycles and with the sole exception of the big redistribution that took place in 1968-1976 from the M40 to the B50 (1.9 pp), the poorest half of the US population was never favored by the successive tax arrangements of the Federal government, at least until Barack Obama became president. This explains why, post-tax, the share of income they enjoy has evolved from 24.4% in 1968 to 19.3% in 2014 (a 21% loss of their share). A smaller loss of 3.5 pp was also experienced by the M40 in those years, with their post-tax share evolving from 45.1% to 41.6% (less than a 10% loss of their share). The winner from this evolution is the T10 group, with a share of income that increased by 8.6 pp post-tax, growing to 39.1% from an original 30.5% (a 28% rise).

Table A4. Income shares and redistribution across electoral cycles. 1968-2014.

	Bottom 50%			Middle 40%			Top 10%		
	B50P	B50	P.R.	M40P	M40	P.R.	T10	T10P	N.R.
Republican governments: R. Nixon & G. Ford									
1968	24.4	20.7	3.7	45.1	44.1	1.0	35.2	30.5	4.7
1976	25.8	20.2	5.6	44.6	45.4	-0.8	34.4	29.6	4.8
Democrat government up to 1980: J. Carter									
1980	25.6	19.9	5.7	44.8	45.9	-1.1	34.2	29.6	4.6
Republican governments up to 1992: R. Reagan & G.H.W. Bush									
1992	21.7	15.8	5.9	43.7	44.4	-0.7	39.8	34.6	5.2
Democrat governments up to 2000: B. Clinton									
2000	20.6	14.6	6.0	42.4	41.5	0.9	43.9	37.0	6.9
Republican government up to 2009: G.W. Bush									
2009	19.8	13.6	6.2	42.5	42.0	0.5	44.4	37.7	6.7
Democrat governments up to 2017: B. Obama									
2014	19.3	12.5	6.8	41.6	40.5	1.1	47.0	39.1	7.9
(2014 is the end of the sample period in the analysis)									

Notes: P indicates post-tax; P.R. and N.R. denote, respectively Positive and Negative Redistribution.