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## Progressive tax-like effects of inflation: Fact or myth? The U.S. post-war experience

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## Progressive Tax-like Effects of Inflation: Fact or Myth? The U.S. Post-war Experience

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# Progressive Tax-like Effects of Inflation: Fact or Myth? The U.S. Post-war Experience

## Abstract

Inflation and earnings growth can push some tax payers into higher brackets in the absence of inflation-indexed schedules. Moreover, inflation may affect the composition of individuals' income sources. As a result, depending on the relative tax burden of labour and capital, inflation may decrease or increase the difference between before-tax and after-tax income. However, whether some and if so which percentiles of the income distribution net benefit from inflation via taxation is a widely unexplored question. We make use of a novel dataset on U.S. pre-tax and post-tax income distribution series provided by Piketty et al. (2018) for the years 1962 to 2014 to answer this question. To this end, we estimate local projections to quantify dynamic effects. We find that inflation shocks increase progressivity of taxation not only contemporaneously but also with some repercussion of several years after the shock. While particularly the bottom two quintiles gain in share, it is not the top but the fourth quintile that lastingly loses.

*Keywords: bracket creep, progressive income taxation, inflation, income distribution*

*JEL Classification: D31, E31, E44, E52, E62*

# 1 Introduction

Inflation and earnings growth can push some tax payers into higher brackets in the absence of inflation-indexed schedules. Moreover, inflation may affect the composition of individuals' income sources. As a result and depending on the relative taxation of labor and capital, inflation may decrease or increase the difference between before-tax and after-tax income. However, whether some and, if so, which percentiles of the income distribution net benefit from inflation via taxation is widely unexplored.<sup>1</sup> We make use of a novel data set on U.S. pre-tax and post-tax income distribution series provided by Piketty et al. (2018) for the years 1962 to 2014 to answer this question. To this end, we estimate local projections to quantify dynamic effects. We find that inflation shocks increase progressivity of taxation not only contemporaneously but also with some repercussion of up to three or more years after the shock. While particularly the bottom two quintiles gain in share, it is not the top but the fourth quintile that lastingly loses through this phenomenon.

The “bracket creep” describes a shift of personal income into a higher tax bracket when taxable nominal income increases over time. This effect is particularly severe in times of high inflation as during the last half of the 1970s where inflation rates averaged 8.9 percent annually. To combat this “bracket creep” effect, the Reagan administration implemented an indexation of the personal exemptions and the tax rate brackets based on the Consumer Price Index (CPI). These provisions were actually enacted in 1981 as part of the Economic Recovery Act, but did not become effective until 1985. The annual adjustment of the marginal tax rates with regard to inflation is also very likely to have an important effect on the distribution of income. First, the net income of the income-poor households increases other things equal. Secondly, the incentives to supply labor is raised for low-productivity households as the net wage rate increases.<sup>2</sup> However, a priori the relationship between inflation and overall income inequality from a theoretical perspective is unclear. The bracket creep can either increase or decrease inequality depending on the initial distribution of income and the top income tax rate. To illustrate this consider the following simple accounting example taken from Heer and Süßmuth (2013): Assume an economy consisting of three workers with different individual productivities so that their labor incomes

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<sup>1</sup> Notable exceptions are Heinemann (2001) and Heer and Süßmuth (2013).

<sup>2</sup> With the help of U.S. panel data on individual tax returns, Saez (2003) uses the “bracket creep” as source of tax variation in order to construct instrumental variable estimates of the sensitivity of income to changes in tax rates. He estimates a labor supply elasticity of taxable income of around 0.4.

are equal to 10, 20, and 30. Furthermore, workers do not have any other source of income. In addition, suppose that the income tax brackets [0,10), [10,20), [20,40] are associated with the marginal income tax rates 0%, 10%, and 20%, respectively. In this case, the after-tax incomes are given by 9, 17, 25 with a Gini coefficient equal to 0.202. If the bracket creep results in a change of the marginal tax rates to 10%, 20%, and 20% for the three brackets (case 1), after-tax income falls to 8.1, 10.8, 25.8 and the Gini increases to 0.209. If, however, the top income tax rate is not 20%, but rather 40% for the income tax bracket [30,40] and inflation moves the marginal tax rates up to 10%, 20%, and 40% (case 2), the after-tax income distribution is instead given by 8.1, 10.8, 23.8, and the Gini coefficient falls to 0.198. However, even in the absence of “bracket creep” inflation may play an indirect role through income composition. Suppose that inflation is positively correlated with labor share; see, e.g. the evidence reported in Alcalá (2000), before-tax income inequality is to decrease given that most capital income is concentrated in the top income percentiles. Of course, taking into account the heterogeneity of wage earners across the income spectrum, see Heathcote et al. (2010), not all wage earners may equally benefit from an increasing labor share. Depending on the progressivity-difference in taxation of labor vis-à-vis capital, inflation can have a distortionary effect and change the redistributive effectiveness of taxation in this way.

There is a well-known early strand of literature representing a broad empirical research effort aimed to contribute information on the (re-)distributional effects of inflation on the U.S. income and/or wealth distribution. It includes the works of Bach and Ando (1957), Budd and Seiders (1971), Bach and Stephenson (1974), and Wolff (1979). With some exceptions<sup>3</sup> this literature either (i) underlies a detailed disaggregate definition of wealth and discriminates a set of different income types (notably before taxes) and portfolios of different demographic groups of households, business and governmental sectors, etc. or (ii) investigates the effects of inflation determined by market forces and by public and private transfer policies, before any subsequent distribution through personal income tax. Two exceptions examining the effects of “bracket creep” on income are Saez (2003) and Immervoll (2005) for the U.S. and Germany, the Netherlands, and the U.K., respectively. In a recent paper,

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<sup>3</sup> Bach and Ando (1957) and Bach and Stephenson (1974) see tax payers as the main beneficiaries of inflation if it is assumed that debt will be paid off by collections from tax payers and therefore the latter can be seen as “indirect debtors.” They argue that if debt in form of governmental interest charges is repaid by taxation, inflation redistributes real purchasing power in favor of the higher income groups since these were slightly heavier tax payers than federal bond holders in the early and mid 1950s and early 1970s.

Coibion et al. (2017) analyze the dependence of pre-tax inequality on monetary policy shocks and find that a contractionary policy increases earnings inequality. The authors use after-tax income inequality only as a robustness check and report no significant difference. Contributions on distributional effects of inflation are also given by Romer and Romer (1998) and Galli and van der Hoeven (2001).

The present paper contributes to the literature in several aspects. In contrast to previous attempts that either focus on pre-tax or post-tax income in quantifying the distributive effect of inflation, we explicitly focus on their difference to see how inflation affects redistribution via taxation. Additionally, our approach critically relies on estimates of income distribution series consistent with aggregate macroeconomic changes. In this regards our study is one of the first to make use of the distributional national account data provided by Piketty et al. (2018). Finally, to the best of our knowledge, we are the first to assess the dynamic response of tax progressivity to inflation shocks by applying local projections as proposed by Jordà (2005).

## **2 Data**

### **2.1 Distributional National Accounts**

We use a novel dataset on U.S. pre-tax and post-tax income distribution provided by Piketty et al. (2018) for the years 1962 to 2014. The crucial innovation of this data is that both pre-tax and post-tax income distribution series mirror exactly U.S. national account data. This is why the authors refer to it as “distributional national accounts”. The full consistency with national accounts data is an important precondition for our analysis given the close link between aggregate income fluctuations and inflation.

If both before and after deductions income fully match national accounts, the whole tax burden and all public spending needs to be allocated. Taking into account that the person who nominally pays taxes not necessarily coincides with the one who bears the tax burden, multiple critical tax incidence assumptions are made. Piketty et al. (2018) claim to keeping it sophisticatedly simple by assuming payroll taxes being entirely paid by labor, corporate taxes by capital, and property taxes by property owners. Hence, we have to keep in mind that our results might be sensitive to the relative taxation of labor vis-à-vis capital. Income before taxes covers all income from labor and capital. It takes into account pensions and social insurances. Income

after taxes is income before taxes net of taxes and transfers.<sup>4</sup> A straightforward alternative is given by the data on pre-tax and post-tax income distribution provided by the Central Budget Office (CBO). These series also combine tax and survey data and thus might better capture top income percentiles than pure survey approaches, which have been predominantly used in the existing literature. However, two crucial features make the CBO data less appropriate for our purposes. First, it ignores taxes at the local and state level. Second, the CBO series starts in the year 1979 only, which would leave our analysis with just 6 observations free of indexation at the federal level.

Figure 1 presents the Gini coefficient measure of inequality before and after taxes over the years 1962 to 2014. A summary of stylized facts might read as follows. In the 1960s income inequality is decreasing, followed by a stagnating period in the 1970s. From 1980 onwards, we observe a clear upward trend for both Gini coefficients before and after taxes. However, the increase is lower after taxes or, put differently, a fraction of the increase is compensated by progressivity of taxation. The variation of the Gini coefficient does not reveal which groups of the income distribution have gained (lost) share in national income over time. Therefore, we calculate the share of total national income for all quintiles over the period 1962 to 2014. Figure 2 suggests that the increase in income inequality is predominantly driven by a rising income share in the top income quintile. Summary statistics are given in Table 1 for the original series and in Table 2 for de-trended series.

## 2.2 Tax Reforms

As documented, e.g., by Auerbach and Feenberg (2000) and Saez (2003), our observation period incorporates a number of major legislative changes in the individual income tax. These include the Revenue Act of 1964, which reduced the top marginal income rate from 91 to 71%; the Tax Reform Act of 1969, which introduced a ceiling of 50% on the marginal tax rate on “earned” income; the Economic Recovery Tax Act of 1981, which reduced the top marginal rate on other income from 70 to 50%, and finally the Tax Reform Act of 1986, which reduced the marginal rate on the highest incomes to 28% and the top marginal rate to 33%. For the period 1962-86, the US tax system may be described as being based on nominal income and deductions, i.e.,

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<sup>4</sup> Here Piketty et al. (2018) also differ from existing publicly available datasets in that the authors do not only claim full transparency, but also provide all code necessary to replicate their results and possibly also to modify critical assumptions.



not indexed to the overall price level, as a system for which inflation raises the real value of taxes paid for any given level of real income, because the system is progressive with respect to nominal income. Thus, during this period an individual with a given real income will appear “wealthier” and face a higher average tax burden. By the mid 1980s, the U.S. tax system became effectively inflation-indexed when provisions that indexed rate brackets, personal exemptions and the so-called “standard deduction” took effect; see Auerbach and Feenberg (2000).

However, parts of the tax system remained prone to “bracket creep.” To prevent the wealthiest taxpayer reducing their tax liabilities to extreme low amounts by making maximal use of regular tax deductions, there exists an alternative calculation scheme, the so-called “Alternative Minimum Tax” (AMT). The AMT effectively cancels some of the deductions such that taxable income increases. Both the regular and AMT scheme are simultaneously calculated and households pay taxes according the scheme producing the higher liability. Up to fiscal year 2013 the threshold at which the alternative scheme starts to take effect was not inflation-indexed but only increased on an ad-hoc basis. As a result, the number of households affected by the AMT has been continuously growing since its introduction in 1969 (see Burman et al. 2008). Although some states followed the federal government in indexing state income tax brackets, out of 34 states with bracketed systems in 2014 still 20 do not automatically adjust brackets for inflation; see Stone (2014).

### 3 Methodology

#### 3.1 Regressions of the BES-type

The traditional empirical model by Schultz (1969) characterizes the relationship between the Gini coefficient of the income distribution ( $G$ ) and inflation ( $\pi$ ) as follows

$$G_t = \beta_0 + \beta_1 \pi_t + \beta_2 u_t + \sum_{i=3}^n \beta_i f^i(t) + \varepsilon_t, \quad (1)$$

i.e. as a linear function of (i) a constant  $\beta_0$ , referring to a component of the Gini coefficient that is autonomous with regard to the explanatories, (ii) the level of contemporaneous inflation  $\pi_t$ , (iii) the current overall unemployment rate  $u_t$ , and (iv) a trend function  $\sum_{i=1}^n f^i(t)$ , separating secular from cyclical influences on income

distribution plus an i.i.d. normal error vector  $\varepsilon_t$ .<sup>5</sup> Some ten years later, Blinder and Esaki (1978) extended this basic strategy by additionally considering relative income shares of different segments of the population as endogenous variables

$$Q_{j,t} = \beta_0 + \beta_1 \pi_t + \beta_2 u_t + \sum_{i=3}^n \beta_i f^i(t) + \varepsilon_t, \quad (2)$$

where  $Q_{j,t}$  denotes the share of the  $j$ -th quintile ( $j = 1, \dots, 5$ ) in the distribution of income among individuals in the  $t$ -th year. This specification allows to estimate whether “side effects” of inflation change the relative income position of the different income groups of the society at stake. Contrary to the Schultz-specification, where inflation is expected to decrease income inequality in the presence of the “bracket creep” (i.e. a negative coefficient resultant for the inflation rate), the Blinder-Esaki-model does not economically predict a specific sign pattern. The signs of the coefficients are rather dependent on institutional characteristics such as the relative distribution of non-indexed financial assets and liabilities across income groups, particularly groups’ ability to anticipate price shocks, etc. By considering  $u_t$ , specifications (1) and (2) implicitly test whether macroeconomic policies, including but not limited to financial policies, which impact on unemployment, will also have an impact on the distribution of income across households.

Several variants of these specifications have been estimated since its establishment as the “standard model” in the area of single-country time series studies on the effects of inflation on income distribution in the 1980s.<sup>6</sup> They are known as Blinder-Esaki-Schultz (BES-) type regressions.

### 3.2 Local Projections

Although BES-type regressions proved insightful, they naturally suffer from disregarding dynamic responses. To see how the effect of inflation changes on income inequality evolves over time, we make use of impulse responses based on local projections. The innovation of local projections as introduced by Jordà (2005) gets obvious in comparison to the standard way of calculating impulse responses. Imagine a variable of interest is generated by a pure AR(1) process and receives an identifiable shock  $\delta$  to itself at time  $t$ , thus  $y_t = \alpha_0 y_{t-1} + \delta_t + \varepsilon_t$ , where  $\varepsilon_t$  represents

<sup>5</sup> Our benchmark specification includes a linear time trend, but in other specifications we also control for a constant and slope change after 1985 when inflation-indexation became effective.

<sup>6</sup> A survey of these traditional empirical studies is given, e.g., by Bulir and Gulde (1995).

the remaining, not identifiable sum of shocks. Usually the cumulated impulse response is then calculated recursively based on the estimated  $\alpha_0$  coefficient:  $\alpha_0$  after one period,  $\alpha_0^2$  after two periods, ... , and  $\alpha_0^k$  after  $k$  periods. Departing from this recursive approach, Jordà (2005) suggests to approximate the impulse response by a local projection on the information set available at time  $t$ . So we locally project

$$\begin{aligned} y_t &= \alpha_0 y_{t-1} + \beta_0 \delta_t + \epsilon_t, \\ y_{t+1} &= \alpha_1 y_{t-1} + \beta_1 \delta_t + \epsilon_{t+1}, \\ y_{t+2} &= \alpha_2 y_{t-1} + \beta_2 \delta_t + \epsilon_{t+2}, \\ &\vdots \\ y_{t+k} &= \alpha_k y_{t-1} + \beta_k \delta_t + \epsilon_{t+k}, \end{aligned}$$

where  $\beta_k$  represents the cumulated impulse response  $k$  periods after a shock. Note that the lag specification does not need to be the same for all  $k$ . If  $\alpha_0$  is biased due to model misspecification, the bias of standard impulse responses increases with time due its recursive calculation. In this regard, locally projecting is more robust to misspecification as all response coefficients are estimated separately.

We apply this strategy to our static BES-type regression in (1) and estimate

$$G_{t+k} - G_{t-1} = \sum_{r=1}^R \beta_{r(k)} \Delta G_{t-r} + \sum_{s=0}^S \gamma_{s(k)} \Delta \pi_{t-s} + \sum_{l=0}^L \phi_{l(k)} \Delta u_{t-l} + \epsilon_{t+k}, \quad (3)$$

where the coefficient  $\gamma_0(k)$  represents the cumulated impulse response of  $G$ ,  $k = 0, \dots, 5$  periods after a one unit shock to inflation  $\pi$  in  $t$ . Note that we subtract  $G_{t-1}$  to standardize the cumulative change. In our main specification we set  $R, S, L = 2$ , but other lag specifications are tested to check robustness.

We then specify the same model with income shares of quintiles as dependent variable and estimate

$$Q_{j,t+k} - Q_{j,t-1} = \sum_{r=1}^R \beta_{r(k)} \Delta G_{t-r} + \sum_{s=0}^S \gamma_{s(k)} \Delta \pi_{t-s} + \sum_{l=0}^L \phi_{l(k)} \Delta u_{t-l} + \epsilon_{t+k}. \quad (4)$$

As is common practice and as proposed by Jordà (2005), we use Newey-West (HAC) standard errors to construct confidence bands.

## 4 Results

### 4.1 Results for BES-type regressions

Table 3 presents the results of our adoption of BES-type regressions. We see that inflation lowers both before-tax and after-tax Gini coefficients. This result is statistically significant and holds across all specifications. When we compare the results for Gini before taxes (columns [1]-[3]) and after taxes (columns [4]-[6]), it seems that the progressivity of taxation significantly increases with inflation. This is also indicated in columns [7]-[9], where the difference between Gini after and before taxation is directly taken as the dependent variable. We further include a dummy variable taking a value of 1 for the period 1985-2014 and 0 otherwise to control for the onset of inflation-indexed federal income taxes. This, however, does not qualitatively alter results. We additionally control for a change in the linear time-trend after 1985 and find that the income inequality decreasing effect of inflation then turns out lower in size for both before-tax and after-tax income inequality. Given that the coefficient for inflation in columns [7]-[9] is merely unaffected, we may conclude that sensitivity to varying trend specifications relates predominantly to the effect of inflation on before-tax income inequality, but not so much on the link between inflation, taxation and income inequality. A one percentage point increase of inflation is associated with an increase of progressivity in taxation by a roughly  $1.5 \times 10^{-3}$  lower after-tax Gini coefficient (the standard deviation of the difference between before-tax and after-tax Gini is  $1.7 \times 10^{-2}$  over our sample period). Results for the difference of before and after-tax income share for all quintiles of the income distribution are shown in Table 4. The coefficients for inflation indicate that the income shares of the highest and lowest quintiles are most affected. A one percentage point increase in inflation is associated with a  $5.7 \times 10^{-2}$  percentage point increase through taxation in the income share of the lowest quintile and a  $8.7 \times 10^{-2}$  decrease in the respective share of the highest quintile. Coefficients are statistically (highly) significant for all quintiles except the third.

### 4.2 Results for Local Projections

Figure 3 presents the estimated impulse responses from equation (3). As before in our BES-type regressions, we take Gini before taxes, Gini after taxes and the difference as dependent variables. The response of Gini before taxes to an inflationary shock is slightly negative, but only weakly statistically significant one year after the

shock. The response of Gini after taxes is also negative, but significantly stronger. We observe a relatively persistent and statistically significant effect up to three years after the shock. The rightmost schedule shows the response of the difference of both coefficients. We observe a highly statistically significant negative response that persists for three years. This means that a positive shock to inflation makes taxation more progressive up to three years after the shock. After three years the effect turns back to the original level, though the estimated coefficients are not statistically significant at conventional levels.

Figure 4 displays the estimated impulse responses from equation (4). For the low income groups, i.e. the first and second quintiles of the income distribution, share in total national income before taxes appears unaffected over the whole response horizon. In contrast, the share in income after taxes reacts positively to a one unit inflation shock, statistically significant up to two years after the shock for the first and up to three years for the second quintile. To see whether the difference between after and before taxes is statistically significant, we include the difference between both shares directly as response variable. What turns out is that a shock to inflation persistently increases the difference. Thus the low income quintiles additionally benefit from redistribution through taxes in the presence of positive inflation changes. The share of the third quintile reacts positively for both measures, before and after taxes. However, the difference appears not to be affected. The response of the difference between shares after and before taxes is most negatively pronounced for the fourth quintile. While the share before taxes significantly increases after a shock, it remains almost unchanged for the after-tax income share. The share of the fifth quintile decreases before taxes, though the coefficients are only statistically significant up to the third year after the shock. The response for the share after taxes is slightly more negative. However, the difference is small and only statistically significantly different from zero in the year of the shock.

We checked the robustness of our local projections by adding the same trend functions as we do in the BES-type specifications. Results remain qualitatively unaltered, but response magnitude varies to some extent. To be sure that no remaining trending properties bias our results, we alternatively run all local projections based on detrended series, such that only fluctuations in the range of common business cycle frequencies are left. We follow Hamilton (2017) by identifying the residuals of a simple projection as the series' cyclical component. Results prove to be robust, except for the fourth quintile, where the difference between after-tax and before-tax income is not as pronounced and persistent as for taking the original series. We also

tried out different lag specifications for equation (3) and (4). Results appear robust and are available on request from the authors.

## 5 Conclusion

Inflation has been referred to in the literature as having a non negligible effect on income inequality (see Coibion et al. 2017). A factor that has been widely dismissed in this respect is the impact of inflation on the progressivity of the tax system. In summary, our results provide some evidence for the fact that inflation impacts on income distribution like a progressive tax. Impulse responses show that this effect persists up to three years, but then turns back to the original level and becomes statistically insignificant.

To see who relatively wins or loses, we look at the response of each quintile's share in national income. Our results draw a relatively clear picture: Individuals grouped in the first and second quintile gain an almost equal share of around 50 basis points. The effect persists significantly up to three years after a shock to inflation. The group of subjects in the middle quintile also see a significant increase in the income share after taxes, but this is mainly explained by an increase in the income share before taxes. Interestingly, the top income groups, i.e. the fourth and fifth quintile, show deviating responses. While the fourth quintile significantly and quite persistently gains before taxes, taxation completely and persistently eliminates this gain. The fifth quintile loses in either case, before taxes (not statistically significant) and after taxes, though this effect mainly holds contemporaneously.

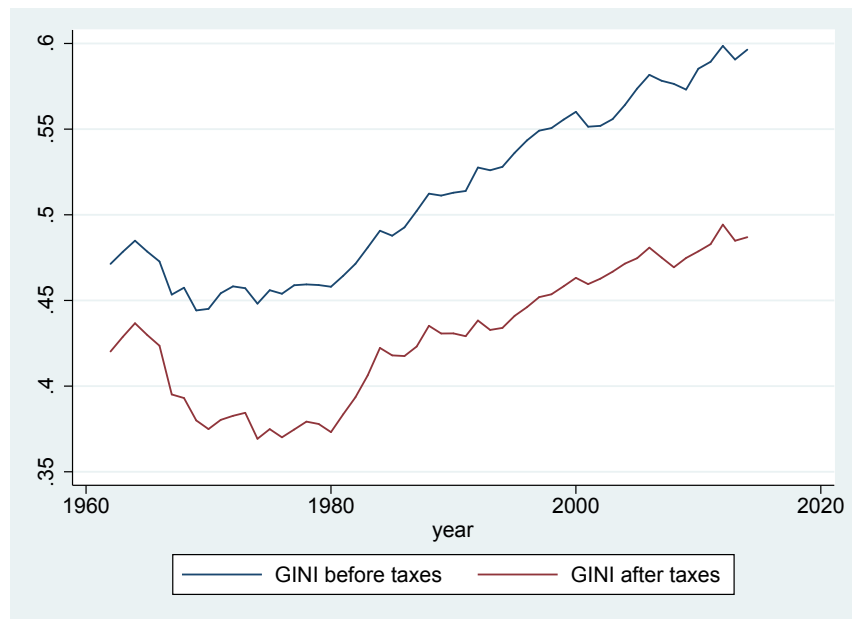
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## Appendix

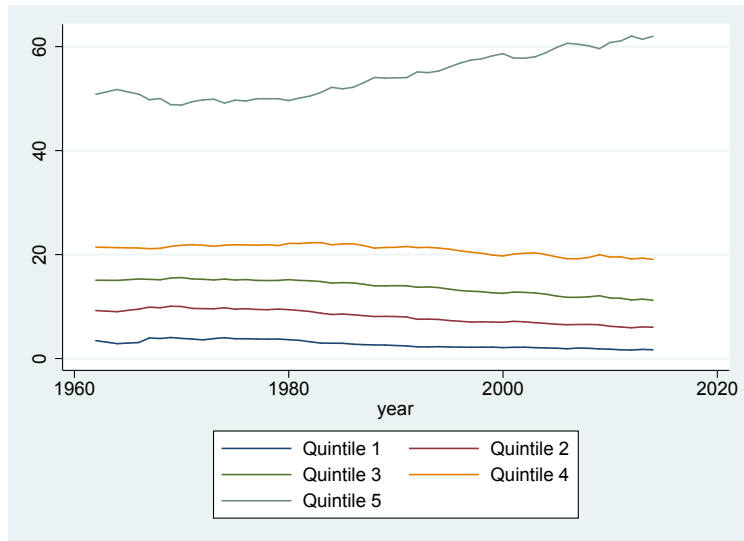


(a)

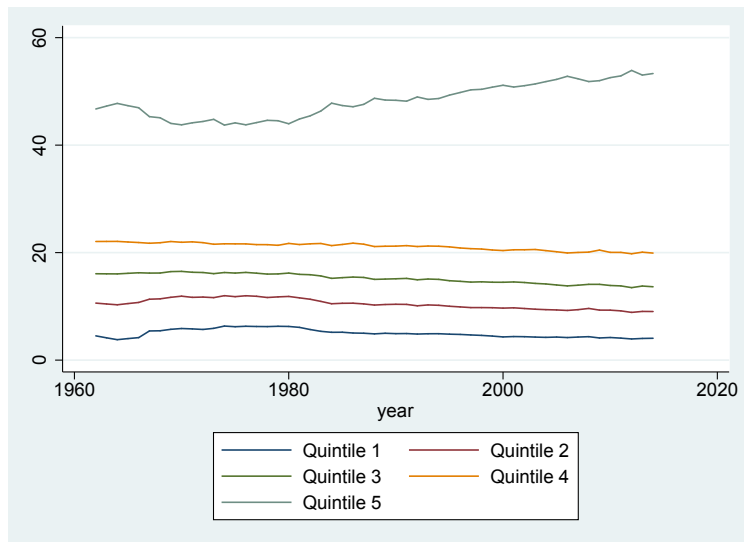


(b) Effect of taxation on Gini:  $\Delta \text{gini} = (\text{gini after tax}) - (\text{gini before tax})$

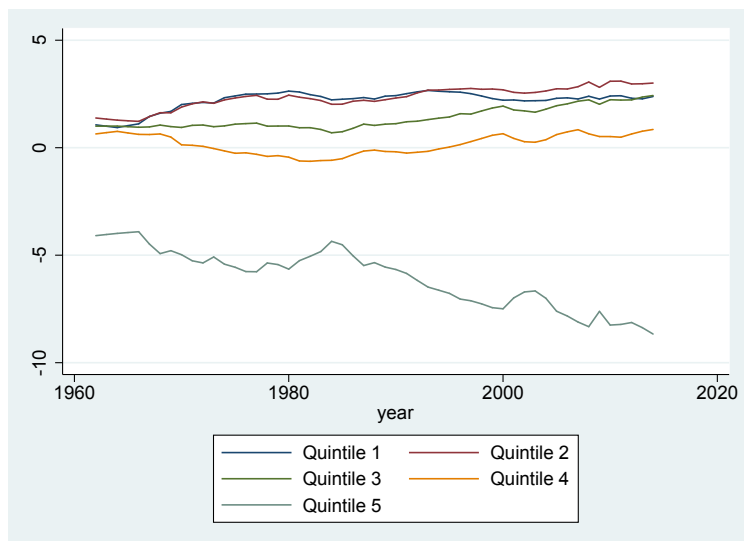
**Figure 1:** Income inequality measured by Gini-coefficient before and after taxes



(a) Income share before taxes



(b) Income share after taxes



(c) Effect of taxation on income shares:  $\Delta taxes = [\text{Income share after taxes}] - [\text{Income share before taxes}]$

Figure 2: Income share of each quintile before and after taxes

**Table 1:** Summary statistics for original series

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>
inflation	4.018	2.812	-0.36	13.51
gini_ati	0.429	0.038	0.369	0.494
gini_atdi	0.442	0.044	0.378	0.518
d_gini	0.083	0.017	0.048	0.109
bti_s_q1	2.769	0.773	1.639	4.043
bti_s_q2	8.121	1.309	5.916	10.065
bti_s_q3	13.832	1.387	11.223	15.569
bti_s_q4	20.972	0.988	19.065	22.299
bti_s_q5	54.306	4.327	48.756	62.03
ati_s_q1	4.963	0.774	3.805	6.338
ati_s_q2	10.457	0.954	8.881	11.991
ati_s_q3	15.204	0.929	13.489	16.512
ati_s_q4	21.138	0.702	19.79	22.092
ati_s_q5	48.239	3.152	43.728	53.9
$\Delta IS\_Q1$	-2.194	0.449	-2.665	-0.937
$\Delta IS\_Q2$	-2.336	0.503	-3.097	-1.225
$\Delta IS\_Q3$	-1.372	0.493	-2.428	-0.695
$\Delta IS\_Q4$	-0.165	0.456	-0.849	0.631
$\Delta IS\_Q5$	6.068	1.365	3.907	8.666
N			53	

Note: bti\_s\_q1 = before-tax income share of 1st quintile; ati\_s\_q1 = after-tax income share of 1st quintile;  $\Delta IS\_Q1 = ati\_s\_q1 - bti\_s\_q1$

**Table 2:** Summary statistics for detrended series

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>
inf_c	0	2.316	-4.28	6.82
gini_bti_c	0	0.009	-0.026	0.016
gini_ati_c	0	0.011	-0.034	0.02
d_gini_c	0	0.006	-0.012	0.011
bti_s_q1_c	0	0.232	-0.417	0.871
bti_s_q2_c	0	0.233	-0.419	0.669
bti_s_q3_c	0	0.225	-0.413	0.537
bti_s_q4_c	0	0.344	-0.904	0.634
bti_s_q5_c	0	0.814	-1.959	1.556
ati_s_q1_c	0	0.321	-0.48	1.194
ati_s_q2_c	0	0.288	-0.602	0.820
ati_s_q3_c	0	0.204	-0.642	0.437
ati_s_q4_c	0	0.201	-0.407	0.487
ati_s_q5_c	0	0.882	-2.106	1.944
$\Delta$ IS_Q1_c	0	0.174	-0.318	0.423
$\Delta$ IS_Q2_c	0	0.163	-0.266	0.307
$\Delta$ IS_Q3_c	0	0.133	-0.301	0.278
$\Delta$ IS_Q4_c	0	0.223	-0.477	0.496
$\Delta$ IS_Q5_c	0	0.467	-0.989	1.027
N			48	

*Note:* \_c denotes the cyclical component. Series are detrended by regressing the variable at time  $t + 2$  on the four most recent values as of time  $t$  and a constant. Residuals of the regression are then taken as cyclical component [see Hamilton (2017) for methodology].

**Table 3:** Differences in income inequality (Gini) before and after taxation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	gini_bti	gini_bti	gini_bti	gini_ati	gini_ati	gini_ati	d_gini	d_gini	d_gini
Inflation rate	-0.00445*** (0.000739)	-0.00469*** (0.000775)	-0.00255*** (0.000645)	-0.00594*** (0.000869)	-0.00610*** (0.000920)	-0.00401*** (0.00103)	-0.00149*** (0.000209)	-0.00141*** (0.000252)	-0.00147** (0.000449)
Unemployment rate	-0.00285** (0.000903)	-0.00319** (0.000994)	-0.000909 (0.000915)	-0.00280** (0.000943)	-0.00303** (0.000995)	-0.000806 (0.00105)	0.0000502 (0.000387)	0.000168 (0.000406)	0.000103 (0.000495)
Post-1985 Dummy		-0.00694 (0.00560)	-0.159*** (0.0330)		-0.00456 (0.00573)	-0.152** (0.0495)		0.00238 (0.00358)	0.00672 (0.0211)
Post-1985 Dummy ×linear time trend			0.00240*** (0.000525)			0.00233** (0.000822)			-0.0000686 (0.000351)
linear time trend	0.00283*** (0.000149)	0.00301*** (0.000201)	0.00104* (0.000498)	0.00174*** (0.000176)	0.00187*** (0.000198)	-0.0000528 (0.000781)	-0.00108*** (0.0000485)	-0.00115*** (0.0000925)	-0.00109** (0.000332)
<i>N</i>	53	53	53	53	53	53	53	53	53
adj. <i>R</i> <sup>2</sup>	0.954	0.954	0.970	0.887	0.885	0.910	0.894	0.893	0.891

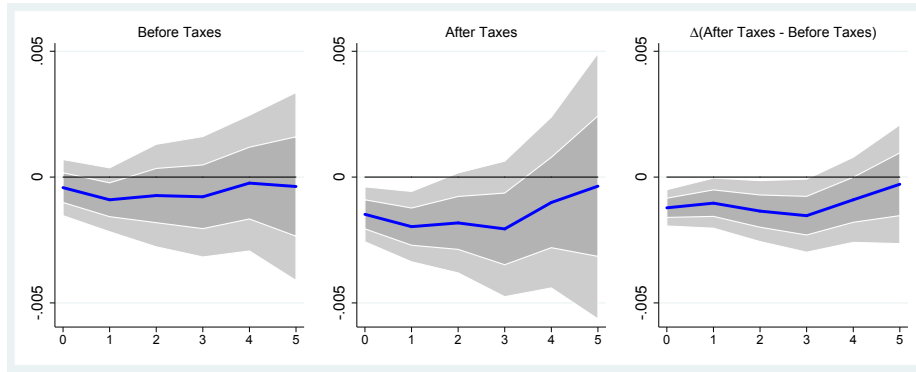
Note: gini\_bti = gini before taxes; gini\_ati = gini after taxes; d\_gini = gini\_ati – gini\_bti,  
Standard errors in parentheses \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 4:** Difference in income shares (in %) by quintiles before and after taxation

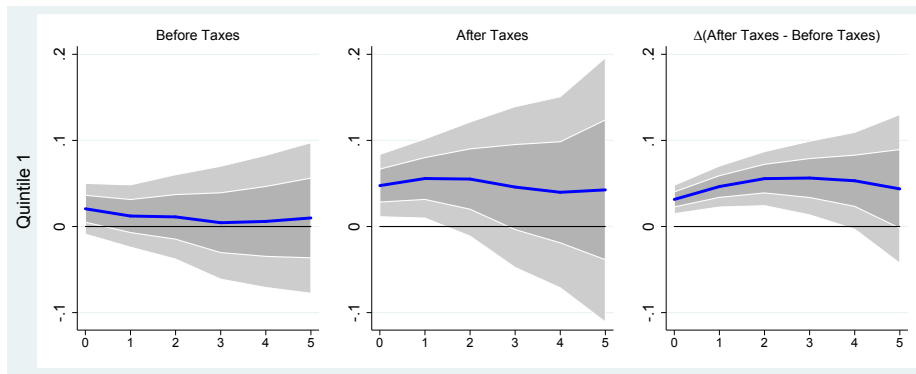
	(1)	(2)	(3)	(4)	(5)
	$\Delta IS\_Q1$	$\Delta IS\_Q2$	$\Delta IS\_Q3$	$\Delta IS\_Q4$	$\Delta IS\_Q5$
Inflation rate	0.0570*** (0.0140)	0.0413** (0.0127)	0.0126 (0.00757)	-0.0241*** (0.00662)	-0.0869** (0.0317)
Unemployment rate	0.0258 (0.0140)	0.0239 (0.0149)	-0.0185 (0.0110)	-0.0867*** (0.0102)	0.0555 (0.0386)
Post-1985 Dummy	4.091*** (0.633)	0.302 (0.593)	-4.315*** (0.375)	-6.449*** (0.256)	6.370*** (1.523)
Post-1985 Dummy ×linear time trend	-0.0571*** (0.0104)	-0.00503 (0.00975)	0.0589*** (0.00629)	0.0899*** (0.00402)	-0.0867** (0.0254)
linear time trend	0.0554*** (0.00987)	0.0364*** (0.00914)	-0.00476 (0.00598)	-0.0472*** (0.00387)	-0.0399 (0.0242)
Observations	53	53	53	53	53
Adjusted $R^2$	0.854	0.893	0.967	0.958	0.920

*Note:*  $\Delta IS\_Q = (\text{income share after taxation}) - (\text{income share before taxation})$ .  
Q denotes 1st to 5th quintile of income distribution.

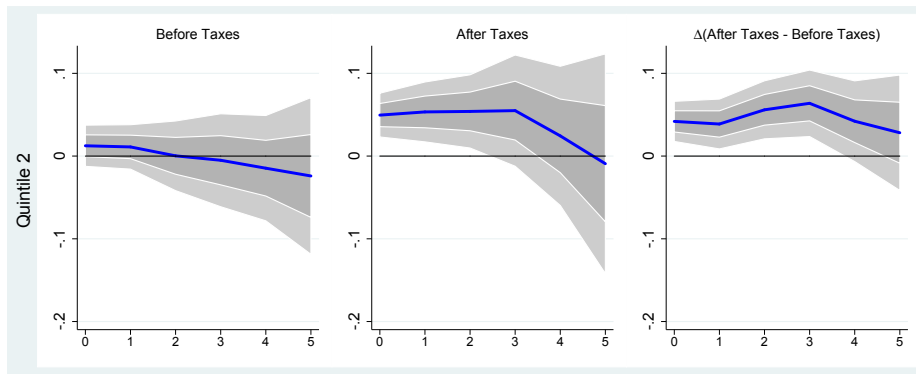
\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



**Figure 3:** Response of income inequality (Gini) to a positive inflation shock. *Note:* Left graph presents Gini before taxes, middle graph Gini after taxes and right graph the difference [Gini after taxes – Gini before taxes]. 90% and 95% confidence bands are based on Newey-West (HAC) standard errors.

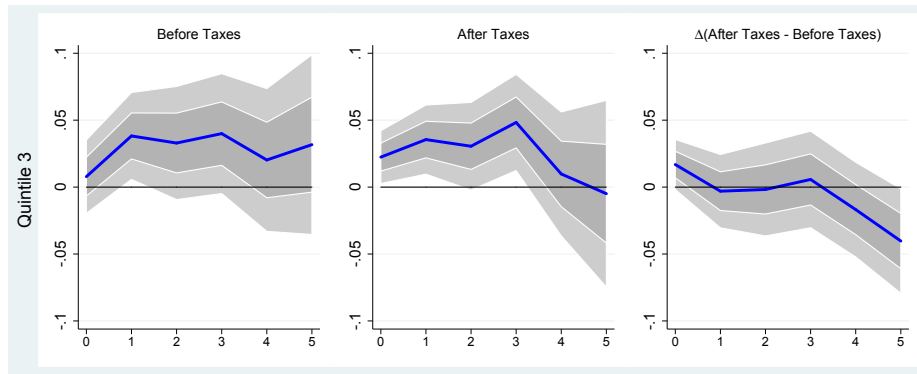


**(a) 1st Quintile**

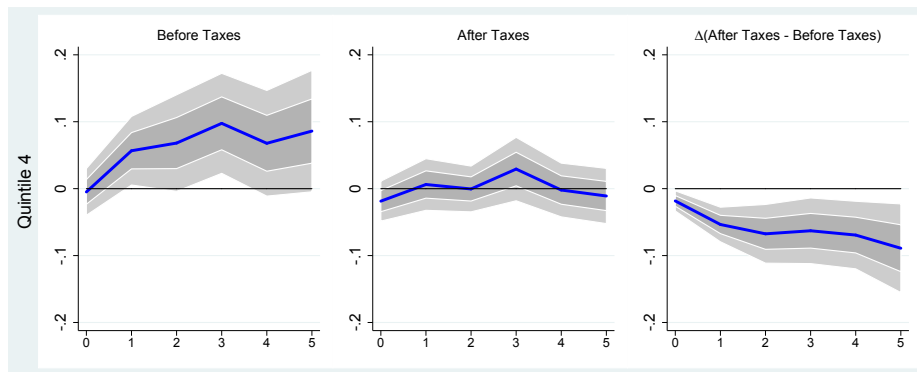


**(b) 2nd Quintile**

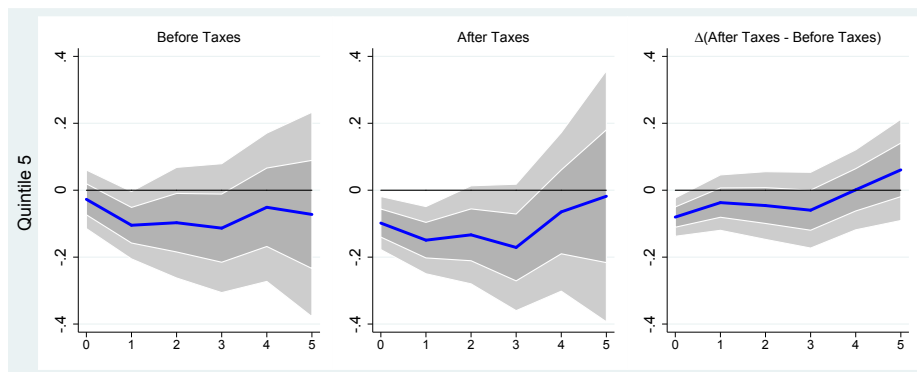
**Figure 4:** Response of income share (in percentage points) by quintiles to a positive inflation shock. *Note:* Horizontal axis depicts time after shock in years. The left graph of each row shows response of income shares before taxes, the middle graph after taxes and the right graph presents the difference between shares after and before taxes. Scale of vertical axis depends on quintile. 90% and 95% confidence bands are based on Newey-West (HAC) standard errors.



(c) 3rd Quintile



(d) 4th Quintile



(e) 5th Quintile

**Figure 4:** Response of income share (in percentage points) by quintiles to a positive inflation shock. *Note:* Horizontal axis depicts time after shock in years. The left graph of each row shows response of income shares before taxes, the middle graph after taxes and the right graph presents the difference between shares after and before taxes. Scale of vertical axis depends on quintile. 90% and 95% confidence bands are based on Newey-West (HAC) standard errors.



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