Working Paper nº 05/2020

The Political Economy of Inequality, Mobility and Redistribution

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WP-05/2020

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September 29, 2020

Abstract

How does the interaction between inequality and social mobility affect the choice of fiscal policy? I analyze this question in a model of democratic politics with imperfect tax enforcement, where the ability of individuals to evade taxes limits the amount of redistribution in the economy. Social mobility creates an insurance motive that increases voluntary compliance, favoring the tax enforcement process. In such an environment, redistributive pressures brought about by an increase in inequality are only implementable in highly mobile societies. On the contrary, when mobility is low, higher inequality reduces tax rates and does not translate into higher redistribution. I empirically analyze the predictions of the model for a sample of 72 countries during the period 1960-2015. Using cross-sectional as well as panel estimation techniques, the results point to a positive relation between market inequality and the level of redistribution only when social mobility is relatively high.

JEL Classification: E62, D31, J62, H26, P16

Keywords: Inequality, Social Mobility, Fiscal Policy, Tax Evasion.

*I am extremely grateful to V.V. Chari, Christopher Phelan and Larry Jones for all their help and advice. I thank the participants in the C.J.P. Workshop at the University of Minnesota, especially Marcos Marcolino, for useful comments, as well as Miguel Ángel Borrella, Raúl Bajo and Jaime Millán. The Peter G. Peterson Foundation provided financial support of this research through a post-doctoral fellowship on long-term fiscal policy at NBER.

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1 Introduction

The standard politico-economic theory derives a positive relation between inequality and the level of redistributive taxation, based on a straightforward application of the median voter theorem (Romer (1975), Roberts (1977), Meltzer and Richard (1981)). In a democratic political environment, the choice of fiscal policy reflects the preferences over taxes of the median (pivotal) voter. Higher inequality implies a poorer median voter relative to the country average, which fosters pressures to increase taxes and redistribution. This mechanism has been used extensively in the analysis of different phenomena: secessionists conflicts (Bolton and Roland (1997)), democratization processes (Acemoglu and Robinson (2006)), or the *endogenous fiscal policy channel* in the literature on the effect of inequality on economic growth (Persson and Tabellini (1994), Alesina and Rodrik (1994)). Nevertheless, its empirical support is far from clear. Early studies based on long run averages and cross country estimation methods found insignificant (or even negative) associations between inequality and redistribution (Perotti (1996), Benabou (1996) or Rodriguez (1999)). Recent research, using more sophisticated panel techniques and data of significantly higher quality, is not unanimous either about the empirical robustness of the theory (see Scervini (2012), Pecoraro (2014) or Choi (2019) for a review). Although based on an appealing economic logic, the so called *Meltzer-Richard effect* does not seem to completely describe the relationship between inequality and fiscal policy.

A variety of theoretical explanations have been proposed to rationalize the empirical evidence (see Harms and Zink (2003), Borck (2007) and Alesina et al. (2011) for reviews). Some of them have focused on social mobility, inter-generational or across the life cycle, in order to generate uncertainty about the future and thus an insurance motive for fiscal policy (the most related to the present paper include Piketty (1995), Benabou and Ok (2001), Moene and Wallerstein (2001)).[1] On the one hand, social mobility implies a risk of downward movements along the income distribution for those relatively rich in the present. Higher inequality would then magnify the potential fall and stimulate their preferences for higher redistributive taxes and transfers. Therefore, downward mobility risk would not overturn, but actually reinforce, the positive relation between inequality and redistribution. On the other hand, significant social mobility can generate prospects for upward mobility among those currently at the lower part of the distribution, that would make them favor lower taxation under the expectation of climbing the social ladder in the future and being hurt by redistributive taxation as net contributors. This is the POUM hypothesis analyzed by Benabou and Ok (2001), who show the theoretical conditions under which a currently poor median voter would favor lower redistribution, even under an increase in the level of inequality.[2] However, they also find that even if theoretically possible, the empirical evidence suggests that the POUM effect is dominated by the demand for

[1] Other papers that theoretically deal with the relation between inequality, mobility and fiscal policy include Hassler et al. (2007), Ichino et al. (2011), and Arawatari and Ono (2015).

[2] The crucial condition is that future's expected income must be an increasing and concave function of today's income. The more concave the transition function, and the longer the period of time that taxes are preset, the lower is the demand for redistribution (Benabou and Ok (2001), p. 449).

social insurance.[3] Consequently, it seems that social mobility *by itself* cannot account for the inconsistency between theory and empirical evidence on the link between inequality and redistribution.[4]

In this paper I try to shed light on the question introducing frictions in the tax enforcement process in the form of tax evasion, which capture the idea that the practical implementation of fiscal policy is not untroubled, but depends on the participation incentives of individuals[5]. Tax evasion can be seen as an outside option for relatively rich individuals who expect to be harmed by the redistributive component of fiscal policy. Although it might involve risks and costs, evasion can be the optimal choice for some individuals if their (expected) redistributive burden is sufficiently large. As a result, tax evasion limits the amount of resources that a relatively poor majority can extract from those relatively rich through the fiscal system. There is empirical support for the intuition that higher inequality is associated with higher tax evasion and non-compliance in developed countries (Bloomquist (2003)), and that evasion is increasing in income (Johns and Slemrod (2010), Alstadster et al. (2019)). The rationale for both findings lies in the fact that increasing inequality shifts the composition of income from employment-based sources (matchable) to investment-based ones (non-matchable), and thus facilitates tax evasion.[6] There is also recent empirical evidence showing that individuals at the top end of the income distribution are more likely to make use of tax heavens to avoid the payment of their tax obligations (Alstadster et al. (2018)). The introduction of tax evasion interacts with the levels of inequality and social mobility and shapes the determination of fiscal policy in a democratic environment. The median voter (or the relatively poor majority), even if decisive in a democratic voting, need to take into account the implementability of fiscal policy when choosing over tax rates. In particular, the compliance incentives of the rich minority. With heterogeneity in the income distribution and social mobility, fiscal policy serves two purposes: redistribution from rich to poor, and insurance against future income uncertainty. These two effects determine how individuals value a given fiscal policy, and therefore their incentives to voluntarily participate in the tax and transfer system. Think of an individual who is relatively wealthy today. In a world with limited socio-economic mobility, he (or his descendants) would be harmed by the redistributive component of fiscal policy, and the insurance benefits would be small. If the tax system is strongly redistributive, he would try to slip away from it by any means. But in a world of high mobility, he would benefit from the insurance effect of fiscal policy, making his voluntary participation in

[3] In a similar way, Cojocaru (2014) finds empirical support for the POUM hypothesis only when risk aversion is low, based on data from the Life in Transition Survey for a large sample of countries. Other papers that empirically analyze how the perceptions or personal experience about the degree of social mobility influence redistributive preferences include Siedler and Sonnenberg (2012) and Alesina et al. (2018).

[4] The other papers cited before (Piketty (1995) and Moene and Wallerstein (2001)) include additional features in their theoretical frameworks which are crucial to obtain a different result from that of Meltzer and Richard (1981). The former incorporates a costly and imperfect learning process about the determinants of future income, which generates differential beliefs among the population that feed into their redistributive preferences. The latter considers an environment in which transfers can be targeted to groups of different income levels, which reverses the standard positive relation between inequality and redistribution only if transfers are targeted to those without earnings.

[5] I am not the first to introduce a compliance-evasion decision in a political economy framework (see Borck (2009), Roine (2006) or Traxler (2009)). Nevertheless, none of these works consider social mobility and its the interaction with tax evasion and inequality in determining the choice of fiscal policy in a democratic setting.

[6] Matchable income refers to income matched to third-arty reporting documents (e.g. wage income), which hinders non-compliance. Unmatchable income is self-reported by the recipient and is therefore easier to hide.

the tax and transfer system more likely. Therefore, social mobility favors the implementation of fiscal policy as it reduces the incentives for evasion and fosters voluntary tax compliance.

I formalize this intuition in a political economy model with two types of individuals. The main result is that the relation between inequality and fiscal policy depends on the level of social mobility. In particular, there is a positive relation between inequality and taxation only in highly mobile societies. If mobility is low, higher inequality decreases tax rates. Consequently, the *Metzer-Richard effect* only materializes if social mobility is sufficiently high, while in relatively immobile societies the desires for higher redistribution of the majority generated by the increase in inequality are hampered by the possibility of evasion of the rich minority. The model also generates a positive relation between redistribution and social mobility, for a given level of market inequality (pre-taxes and transfers), which in turn implies a negative relation between net inequality and social mobility that resembles the cross-country empirical evidence of a "Great Gatsby Curve" documented by Corak (2013a). I extend the benchmark model in two different ways. First, I introduce deviations from perfect democracy allowing for political power to be unevenly distributed among rich and poor. This extension bears a resemblance to the empirical study of Karabarbounis (2011), that analyzes whether rich individuals have higher political weight and therefore fiscal policy reflects their preferences more intensely than their share on the population would imply in a perfectly democratic environment.[7] I show that, as long as the political power of the rich is not too large, the main results of the basic setting carry forward. Second, I generalize the two-type model to a distribution of types, and show that the differential effect of inequality on redistribution depending on the level of social mobility holds again. The main difference of this extension is that there is positive evasion in equilibrium, so it is possible to analyze the comparative static effects of inequality, mobility or the tax enforcement technology, on the aggregate level of evasion. The results show that evasion is always increasing in inequality, but more so in less mobile economies.

I empirically analyze the main results of the theoretical model for an international sample of 72 countries during the period 1960-2015. I make use of the recently published Global Database on Intergenerational Mobility (GDIM (2018)), which provides estimates of the intergenerational elasticity of income (IGE) for a total of 75 countries, implying a substantial increase in the number of observations compared to the often used 26-country sample provided by Corak (2006). I use data on inequality from the Standardized World Income Inequality Database (SWIID, Solt (2019)), because of its extensive coverage (across countries and years) of market and net Gini coefficients (pre- and post-taxes and transfers inequality respectively). As a result, it allows to use *absolute redistribution* as an outcome variable. Defined as the difference between market and net Gini coefficients, absolute redistribution is a direct measure of the the size of the reduction in inequality due to redistributive taxes and transfers.[8] I estimate an interaction term model that captures

[7]This feature is also used in the theoretical analysis of Benabou (2000). His paper derives a non-monotone relation between inequality and fiscal policy, but as a result of imperfections in the credit and insurance markets, and not due to the interaction of social mobility and imperfect tax enforcement.

[8]Previous empirical studies have generally turned to indirect measures of redistribution such as total government spending, marginal or average tax rates, or social spending. A notable exception is Milanovic (2000), who uses pre- and post-taxes and

the differential effects of market inequality on the level of redistribution depending on the degree of social mobility in the society. I follow two econometric approaches: First, a long run cross-sectional approach in the spirit of the early tests of the theory (e.g. Perotti (1996), Persson and Tabellini (1994) or Milanovic (2000)); second, a panel data perspective based on the System-GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), standard in more recent studies (e.g. Ostry et al. (2014) or Grndler and Scheuermeyer (2018)). In both cases, the results generally support the main prediction of the model. The coefficient for the interaction term is highly significant and its sign implies a positive association of inequality and redistribution in highly mobile societies, while close to zero (or even negative) when mobility is low. Specifically, the predicted effect of a 1-Gini point increase in market inequality on the level of absolute redistribution is between three and four times higher for an economy at the 75th percentile level of social mobility than for an economy at the 25th percentile. The results also show that, for a given level of inequality, more mobile economies redistribute more, in line with the model comparative statics. The results are robust to a battery of sensitivity and robustness checks, both for the cross-sectional estimation as well as the panel results.

The rest of the paper is organized as follows. Section 2 presents a two type model in which the main results of the paper are derived. Section 3 extends the basic model allowing for deviations from a perfectly democratic setting, and assuming a more general distribution of types. The empirical analysis on how the interaction between inequality and social mobility influences redistribution is presented in section 4. Section 5 provides some concluding remarks.

2 Model

In this section I present a theoretical two-type model in which inequality, social mobility and tax evasion interact in the choice of fiscal policy. I do it introducing these features sequentially, in order to clearly show the economic mechanism behind each of them. First, inequality is the only driver of fiscal policy. Second, I introduce the compliance-evasion decision and show how the equilibrium tax rate turns decreasing in inequality. Finally, I include uncertainty about future income (mobility) and prove the main result of the section (i.e. the differential response of taxation to inequality depending on the level of social mobility).

2.1 Basic Setting

There is a continuum of individuals indexed by $i \in [0, 1]$, who live for one period. Each individual receives an exogenous endowment at the beginning of the period, that can be high or low, $y^i \in \{y_H, y_L\}$. I assume that there is a fraction $0 < \delta < \frac{1}{2}$ of high endowment individuals, so average income in the economy is given

transfers income data for 24 countries to analyze how the share of aggregate income accruing to different quantiles varies with fiscal policy. The present paper uses a similar approach, but considers Gini coefficients and a substantially larger sample.

by $\bar{y} = \delta y_H + (1-\delta)y_L$. Preferences are common across individuals, who only value final consumption, and given by $U(c) = \frac{c^{1-\sigma}}{1-\sigma}$, where $\sigma \geq 1$.

There is a government that collects proportional taxes on income, and redistributes total tax revenue across individuals in a lump-sum fashion. The tax rate $\tau \in [0,1]$, is determined in a democratic political process that takes place once endowments are known to everyone, in which each individual has one vote.

Given that the low endowment individuals constitute a majority of the population, the equilibrium tax rate (τ^*) will be the most preferred tax for them. In this simple setting with no tax distortions, there are only two possible cases. If income inequality is non-existent ($y_H = y_L$), every individual is indifferent between any pair of tax rates. If income inequality is positive ($y_H > y_L$), the equilibrium tax rate is always 1. Intuitively, the poor individuals are extracting as much resources as possible from the rich ones, given that taxation is frictionless in every sense.[9]

2.2 Tax Enforcement Frictions

Assume now that the tax enforcement process is not perfect. Once the endowments are realized and the vote on fiscal policy has taken place, each agent decides if he wants to voluntarily comply with his tax obligations, or try to circumvent the tax and transfer system through tax evasion. For simplicity, individuals can only either pay their due amount in full, or hide their total endowment, so it is not possible to hide a fraction of their endowment. Let $\rho^i \in \{0,1\}$ determine the compliance-evasion decision of individual i, with $\rho^i = 1$ denoting evasion. The government audits an exogenous fraction of the population, $\theta \in [0,1]$. The auditing process is costless for the government. If an individual decides to evade taxes and is audited, the government imposes an exogenous proportional penalty on his income $\eta \in [0,1]$, and he keeps the rest. In addition, he is excluded from transfers. If a tax evader is not audited, he consumes his initial endowment. In practice, it is as if he was living in autarky, not paying taxes nor receiving transfers. Total tax revenue, voluntarily paid and enforced through audits (collected penalties), is lump-sum redistributed among those individuals who did not evade. This way of modeling tax evasion resembles public programs that condition their benefits to previous participation, like pension systems or unemployment insurance in many countries.

Definition 1 (Politico-Economic Equilibrium). *An equilibrium is a tax policy and a set of private economic decisions such that:*

1. *The tax rate (τ^*) cannot be defeated by any alternative in a majority vote.*
2. *The decision of whether to comply or evade taxes (ρ^i) is optimal for every individual.*

[9] The introduction of elastic labor supply in a production economy, or exogenous taxation costs, gives rise to an interior solution for the tax rate. In such a setting, we obtain the classic result that the equilibrium tax rate is increasing in the level of income inequality (Meltzer and Richard (1981) or Roberts (1977). I do not include this feature in the model for simplicity. Anyhow, the results derived in the following subsections are not affected by this choice.

Let $\bar{V}(\tau)$ be the utility of an individual with high endowment, and $\underline{V}(\tau)$ the utility of a low endowment individual, when everyone complies with the tax rate τ. Let $\bar{V}^e$ and $\underline{V}^e$ be the utility in case of tax evasion for a high and low endowment individual respectively. Thus:

$$\bar{V}(\tau) = U\left((1-\tau)y_H + \tau\bar{y}\right) \tag{1}$$

$$\underline{V}(\tau) = U\left((1-\tau)y_L + \tau\bar{y}\right) \tag{2}$$

$$\bar{V}^e = \theta U\left((1-\eta)y_H\right) + (1-\theta)U\left(y_H\right) \tag{3}$$

$$\underline{V}^e = \theta U\left((1-\eta)y_L\right) + (1-\theta)U\left(y_L\right) \tag{4}$$

It is always true that $\underline{V}(\tau) \geq \underline{V}^e$, so a poor individual always voluntarily complies with his tax obligations. Intuitively, for any tax rate the poor always receive a non-negative net transfer, while evasion implies at best consuming his pre-tax endowment, thus compliance is always preferred. For a rich individual, his optimal compliance-evasion decision depends on the tax rate (τ), and the tax enforcement parameters (θ, η). Therefore, when voting over tax rates, the poor individuals take into account that the rich might opt for tax evasion if taxes are too high. Imperfect tax enforcement limits the ability of poor individuals to extract resources from the rich and, if audit and penalty rates are not too high, makes full redistribution not implementable. The following proposition characterizes the politico-economic equilibrium as the highest tax rate that satisfies that those with high endowment choose to comply with their fiscal obligations.

Proposition 1. *The equilibrium tax rate (τ^*) is the highest tax such that $\bar{V}(\tau) \geq \bar{V}^e$. For $U(c) = \frac{c^{1-\sigma}}{1-\sigma}$, it is given by:*

$$\tau^* = \min\left\{\frac{y_H(1-A)}{y_H - \bar{y}}, 1\right\} \tag{5}$$

Where $A = \left[\theta\left((1-\eta)^{1-\sigma} - 1\right) + 1\right]^{\frac{1}{1-\sigma}}$.

All the proofs can be found in the appendix. The characterization of the equilibrium tax rate allows to analyze how it would vary with changes in the rest of exogenous variables of the model and, in particular, with the level of inequality. I use the market Gini coefficient (before taxes and transfers) to measure inequality. In this simple setting with only two types of individuals, it is given by the difference between the share of income of the high endowment individuals and their share in the population. The market Gini coefficient is thus given by $\delta\left((y_H/\bar{y}) - 1\right)$, while net Gini (after taxes and transfers) would be $\delta(1-\tau)\left((y_H/\bar{y}) - 1\right)$. In the propositions below, I will refer to a mean preserving spread in endowments as an increase in inequality, as such a transformation increases the value of the Gini coefficient (increases y_H while keeping $\bar{y}$ constant). The following propositions establish some comparative static results regarding the effect of changes in the tax enforcement parameters and the level of inequality in initial endowments for the case of an interior solution.

Proposition 2. *The equilibrium tax rate (τ^*) is increasing in the audit rate (θ) and the penalty rate (η).*

Proposition 3. *Let (y'_H, y'_L) be a mean preserving spread of (y_H, y_L), so that $y'_H > y_H$, $y'_L < y_L$ and $\bar{y}' = \bar{y}$. A mean preserving spread decreases the equilibrium tax rate (τ^*).*

The intuition behind proposition 2 is clear. An increase in the probability of being audited (θ) or the penalty when audited (η), discourages evasion for the rich, allowing for the implementation of a higher tax rate. When the government is sufficiently efficient enforcing fiscal policy, evasion is too risky and a fully redistributive tax scheme is implementable. Proposition 3 shows how the introduction of tax evasion reverses the sign of the relation between (market) inequality and tax rates predicted by classic models. An increase in inequality increases the utility for the rich under both compliance and evasion, but the increase in the latter is always bigger, leading to a decrease in the equilibrium tax rate.

2.3 Social Mobility

In order to introduce social mobility, assume that each individual is born to a family that can be of two types, high or low. There is a fraction $\delta \in \left(0, \frac{1}{2}\right)$ of high type families. The family type of each individual determines the stochastic process that will govern the realization of his endowment. In particular, an individual born to a high type family will have a high endowment with probability π, and a low endowment with probability $(1-\pi)$, $\pi \in [0,1]$. Conversely, an individual born to a low type family will have a low endowment with probability γ and a high endowment with probability $(1-\gamma)$, where again $\gamma \in [0,1]$. To keep the fraction of high type families and endowments constant and equal to δ, I impose that $\gamma = 1 - \frac{(1-\pi)\delta}{(1-\delta)}$ for the rest of the analysis.[10] This assumption also ensures that average income in the economy is again given by $\bar{y} = \delta y_H + (1-\delta) y_L$. It will be helpful to assume that $\pi \geq \frac{1}{2}$, so an individual born to a rich family is more likely to turn out rich than poor.

The family to which an individual is born is known at the beginning of the period, but the realization of actual endowments is only known after the vote on fiscal policy has taken place, and the evasion-compliance decision has been made. The timing of the model with tax enforcement frictions and social mobility is then:

1. Family types are realized.
2. Majority vote on the tax rate τ.
3. Compliance/evasion decision by each individual ρ^i.
4. Uncertainty is resolved and the endowment of each individual is known, y^i.
5. Audit process.
6. Redistribution of total tax revenue (voluntarily paid plus enforced).
7. Consumption takes place, c^i.

[10]Notice that this assumption also allows to characterize social mobility using π or γ indistinctively. In the propositions below I refer to $(1-\pi)$ as my measure of mobility. Higher values of $(1-\pi)$ imply higher downward mobility and, given the mentioned assumption, also higher upward mobility.

Using the same notation as in the previous subsection, we can define the expected utility of individuals born to high and low families, when everyone complies with the tax rate τ, as $\bar{V}(\tau)$ and $\underline{V}(\tau)$ respectively. Let $\bar{V}^e$ and $\underline{V}^e$ denote their utilities under evasion. Notice that the position of the bar determines the family type of the individual, not his endowment after all uncertainty has been resolved (y^i). Therefore, we have:

$$\bar{V}(\tau) = \pi U\left((1-\tau)y_H + \tau\bar{y}\right) + (1-\pi)U\left((1-\tau)y_L + \tau\bar{y}\right) \tag{6}$$

$$\underline{V}(\tau) = \gamma U\left((1-\tau)y_L + \tau\bar{y}\right) + (1-\gamma)U\left((1-\tau)y_H + \tau\bar{y}\right) \tag{7}$$

$$\begin{aligned}\bar{V}^e = &\pi\left(\theta U\left((1-\eta)y_H\right) + (1-\theta)U\left(y_H\right)\right) + \\ &(1-\pi)\left(\theta U\left((1-\eta)y_L\right) + (1-\theta)U\left(y_L\right)\right)\end{aligned} \tag{8}$$

$$\begin{aligned}\underline{V}^e = &\gamma\left(\theta U\left((1-\eta)y_L\right) + (1-\theta)U\left(y_L\right)\right) + \\ &(1-\gamma)\left(\theta U\left((1-\eta)y_H\right) + (1-\theta)U\left(y_H\right)\right)\end{aligned} \tag{9}$$

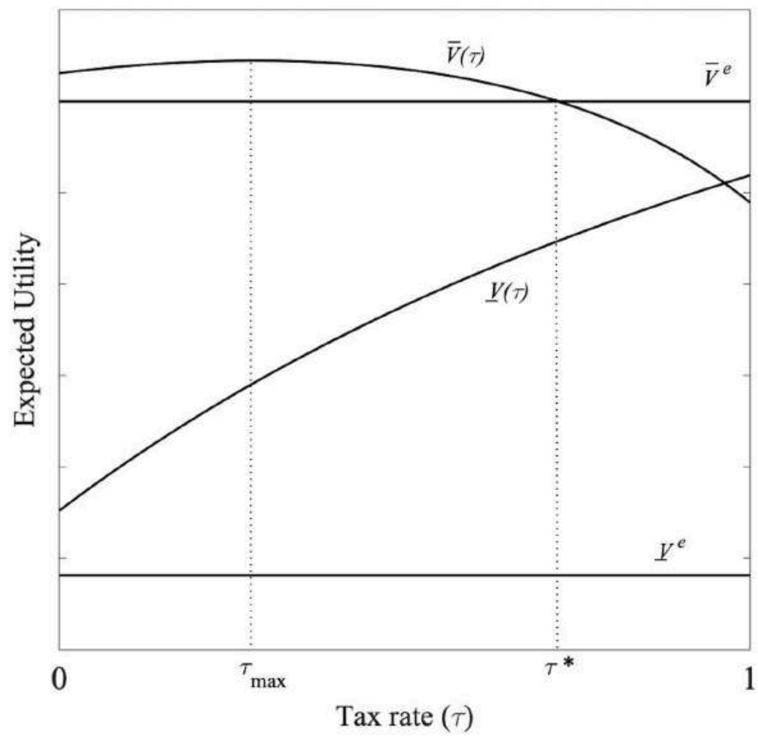
Figure 1 shows graphically the expected utilities under compliance and evasion of individuals born to the two types of families. Given the assumptions on π and γ, fiscal policy is unambiguously beneficial for individuals born to a poor family, as they always expect to receive a positive net transfer, and taxation reduces their income uncertainty. Even though upward movements along the social ladder are possible, they are unlikely, so the prospects for upward mobility do not give sufficient incentives for those born to low type families to opt for evasion ($\underline{V}(\tau) > \underline{V}^e$, for any τ). Furthermore, their expected utility is strictly increasing in τ, so they will try to implement the highest tax rate possible. For individuals born to rich families, the benefits in terms of insurance trade off against the cost in terms of redistribution to the poor. Again, the compliance-evasion decision for these individuals will depend on the tax rate decided in the majority vote, and the rest of exogenous parameters of the model ($y_H, y_L, \pi, \theta, \eta$). For a sufficiently high tax rate, the redistributive costs are greater than the insurance benefits, and higher tax rates are always harmful for them. The following lemma summarizes the previous discussion, and will be helpful to understand the characterization of the equilibrium tax rate in this environment.

Lemma 1. *$\underline{V}(\tau)$ is increasing in the tax rate (τ). Further, there exists $\tau_{max} < 1$ such that $\bar{V}(\tau)$ is decreasing for any tax rate $\tau > \tau_{max}$.*

Lemma 1 also implies that there is a political conflict in the setting of fiscal policy, which will be solved through the political process. Individuals from poor families want to set the highest possible tax, while those from rich families support increases in taxes up to a certain point (τ_{max}), but are harmed with any further increase. Again, the equilibrium tax rate will be the highest tax rate that satisfies the participation constraint of those born to rich families (τ^* in figure 1). That is, that ensures that rich family individuals voluntarily participate in the tax and transfer system ($\bar{V}(\tau) \geq \bar{V}^e$).[11]

[11] Notice also that τ^* always lays in the downward slopping part of $\bar{V}(\tau)$. This feature will be used in the proofs of the following propositions.

Figure 1: Expected Utility Under Compliance and Evasion



Note: $\bar{V}(\tau)$ denotes the expected utility of an individual born to a high family type when everyone in the economy complies with their tax obligations, and $\bar{V}^e$ denotes his utility when he opts for tax evasion. $\underline{V}(\tau)$ and $\underline{V}^e$ denote the expected utility of compliance and evasion for a low family type individual. Figure generated for $\sigma = 2.7$, $\pi = 0.7$, $\theta = 0.1$, $\eta = 0.3$, $y_H = 6$, $y_L = 2.25$, $\delta = 0.2$.

With tax enforcement frictions and social mobility, the politico-economic equilibrium definition is the same as in the previous subsection. The main difference is that now uncertainty on future endowments favors the tax enforcement process due to the insurance benefit of fiscal policy. As a result, everything else equal, higher mobility (lower π) leads to higher equilibrium tax rates. This result is formally shown in the next proposition, which also shows that the tax rate is again increasing in the audit and penalty rates.

Proposition 4. *The equilibrium tax rate* (τ^*) *is increasing in the audit rate* (θ)*, the penalty rate* (η)*, and the level of economic mobility* $(1 - \pi)$*.*

The intuition regarding the relation between the audit rate (θ) and the penalty rate (η) and the equilibrium tax rate (τ^*) is similar to that in proposition 2. Increases in those parameters imply a more efficient tax enforcement process, which discourages evasion for those individuals born to rich families, allowing for the implementation of higher taxes. With respect to social mobility, the proposition implies that more mobile societies should have higher taxes, everything else being constant. This is again intuitive, as higher uncertainty about future income increases the expected benefits of the tax and transfer system for rich family individuals, making them more reluctant to evade taxes and permitting the implementation of a higher tax rate. As a result, the model predicts a negative relation between social mobility and net inequality (for a given level of market inequality), resembling the empirical regularity commonly known as the "Great Gatsby curve" (Corak (2013a)). The next proposition characterizes the relationship between market inequality and tax rates, and shows how this relation is mediated by the level of social mobility.

Proposition 5. *Let (y'_H, y'_L) be a mean preserving spread of (y_H, y_L), so that $y'_H > y_H$, $y'_L < y_L$ and $\bar{y}' = \bar{y}$. Then there exists π^* such that :*

(i) For any $(1-\pi) > (1-\pi^*)$, an increase in inequality increases the equilibrium tax (τ^*).

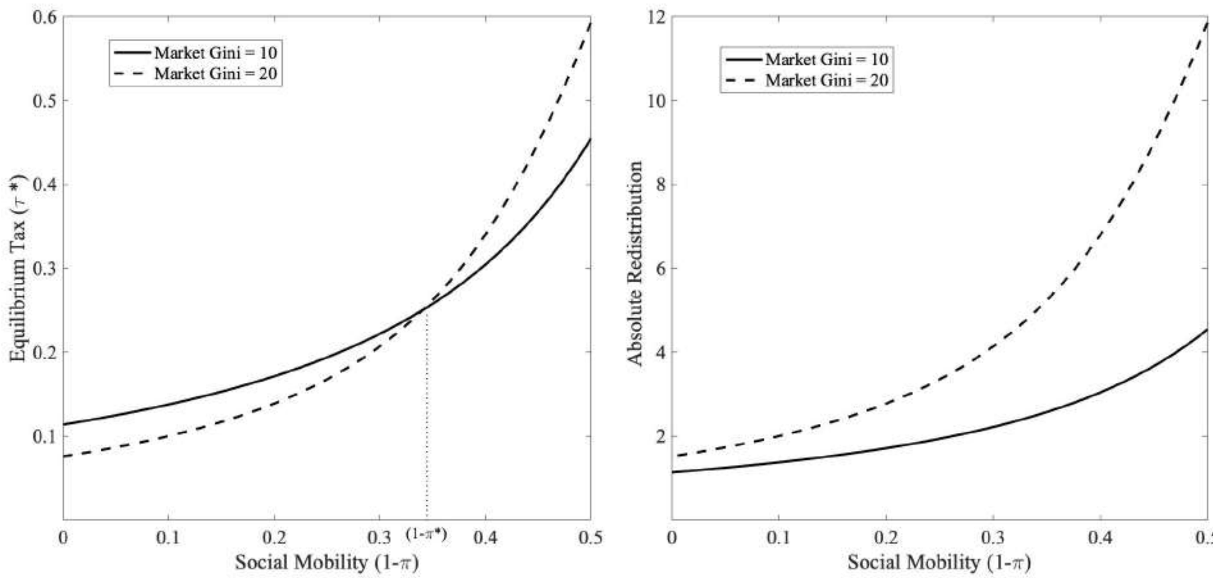
(ii) For any $(1-\pi) < (1-\pi^*)$, an increase in inequality decreases the equilibrium tax (τ^*).

(iii) For $(1-\pi) = (1-\pi^*)$, an increase in inequality does not change the equilibrium tax (τ^*).

Proposition 5 is the main result of the paper. Intuitively, when mobility is relatively high, the risk sharing benefits of fiscal policy more than offset its redistributive costs for the rich, favoring the tax enforcement process and allowing for an increase in taxation as a response to the rise in inequality. When mobility is relatively low, the increase in the redistributive burden of fiscal policy for the rich is big enough to make them prefer tax evasion unless tax rates are lowered. Notice that proposition 5 does not necessarily imply that $(1-\pi^*)$ is always in the interval $(0, \frac{1}{2})$. For some combinations of parameters, it could be that $(1-\pi^*) > \frac{1}{2}$, so that higher inequality decreases the equilibrium tax for any level of mobility; or $(1-\pi^*) < 0$, and higher inequality increases the equilibrium tax for any level of mobility. Figure 2 (left) shows an example in which $(1-\pi^*) \in (0, \frac{1}{2})$, and an increase in market inequality has different effects on tax rates depending on the level of economic mobility. Specifically, the figure shows the effect on the equilibrium tax rate when market Gini increases from 10 to 20, for different levels of socio-economic mobility. The cut-off level of mobility $(1-\pi^*)$ is close to 0.34 in this case. A society with higher mobility would experience an increase in tax rates, while a society with less mobility would see a fall in taxation. The figure shows as well that the relation between social mobility and equilibrium tax rates is always positive for a given level of market inequality, as was established in proposition 4. We can see this observing that both lines, which keep inequality constant, are increasing in social mobility $(1-\pi)$.

In the empirical analysis of section 4, I look at measures of redistribution, not tax rates, but there is a clear link between them. Therefore, it is convenient to briefly discuss different ways to measure redistribution, and derive their counterparts in the theoretical model. To analyze the reduction of inequality brought about by fiscal policy, the most adequate measure would be the difference between market and net Gini coefficients. This is usually referred in the literature as absolute redistribution (AR), while relative redistribution (RR) is just the percentage reduction in the Gini coefficient due to taxes and transfers. We can obtain expressions

Figure 2: Inequality, Equilibrium Tax and Redistribution



Note: Figures generated for $\sigma = 1.5$, $\theta = 0.1$, $\eta = 0.3$, $\delta = 0.2$.

for absolute and relative redistribution in the model as:

$$\text{AR} = \delta\left(\frac{y_H}{\bar{y}} - 1\right) - \delta(1-\tau)\left(\frac{y_H}{\bar{y}} - 1\right) = \delta\tau\left(\frac{y_H}{\bar{y}} - 1\right) \tag{10}$$

$$\text{RR} = \frac{\delta\left(\frac{y_H}{\bar{y}} - 1\right) - \delta(1-\tau)\left(\frac{y_H}{\bar{y}} - 1\right)}{\delta\left(\frac{y_H}{\bar{y}} - 1\right)} = \tau \tag{11}$$

The effect of an increase in inequality on the level of relative redistribution just mimics that of equilibrium tax rates. Anyhow, the effect on absolute redistribution is more subtle. The term in parenthesis in the last expression for AR increases with inequality (mean preserving spread) but, according to proposition 5, the tax rate will increase or decrease depending on the level of social mobility. Thus, when social mobility is relatively high ($\pi < \pi^*$), higher inequality is unambiguously associated with higher absolute redistribution. Instead, if social mobility is relatively low ($\pi > \pi*$), the effect can be positive or negative. It is clear though that the effect is increasing in social mobility. Figure 2 (right) shows a case in which an increase in inequality produces higher absolute redistribution for any level of social mobility. From the picture it is clear as well that the (positive) effect is stronger for more mobile societies. Other measures of redistribution used in the literature are related to tax revenue and spending. In this simple model with no public saving or borrowing, total tax revenue equals total government spending, which is given by $\tau^*\bar{y}$. Moreover, given that the only purpose of the fiscal system is redistributive, this expression would also represent social spending (in aggregate and per capita terms). Notice that a mean preserving spread does not change $\bar{y}$, so these other measures behave in the model just like the equilibrium tax rate (as depicted by the left graph in figure 2).

3 Extensions

This section extends the baseline model in two directions. On the one hand, I allow for deviations from perfect democracy, assuming that high income (or family) individuals might have higher political power than those with low endowments. As a result, political outcomes reflect the distribution of political power in the society. On the other hand, I extend the two-type model using a more general distribution of types (log-normal distribution). I show that the main results of the previous section still hold in these settings.

3.1 Imperfect Democracy

Following Acemoglu and Robinson (2006), I capture the idea that political power in unevenly distributed among the population assuming that the equilibrium policy is the weighted average of the indirect utilities of the two groups, where the weights are the political power of rich and poor, χ and $(1-\chi)$ respectively, $\chi \in [0,1]$. Notice that when $\chi = 0$, we are in the case of a perfectly democratic society, where the equilibrium policy reflects the preferences of the median voter, just as in section 2. As long as $\chi > 0$, the equilibrium tax rate partially reflects the preferences of rich individuals. In the extreme case of $\chi = 1$, the rich hold all the political power and the tax rate will be the most preferred tax for them, even though they are a minority.

Think of the basic setting without tax enforcement frictions nor social mobility. The equilibrium tax solves the following maximization problem:

$$\max_{\tau\in[0,1]} \chi\delta\frac{((1-\tau)y_H+\tau\bar{y})^{1-\sigma}}{1-\sigma}+(1-\chi)(1-\delta)\frac{((1-\tau)y_L+\tau\bar{y})^{1-\sigma}}{1-\sigma} \tag{12}$$

The first order condition for this problem yields:

$$\frac{c_L}{c_H}=\left(\frac{1-\chi}{\chi}\right)^{1/\sigma}=B \tag{13}$$

Where c_L and c_H are the consumption levels of individuals with a low and high endowments respectively, for tax rate τ, and $B \geq 0$. The equilibrium tax rate thus depends on the level of income inequality and the distribution of political power across the income groups. In particular, when $\chi < 1/2$, the relatively poor majority has sufficient political power to implement their most preferred tax rate, which in this case implies full redistribution ($\tau^* = 1$). When $\chi > \frac{1}{1+\left(\frac{y_L}{y_H}\right)^{\sigma}}$, the contrary takes place and the rich have sufficient political power to implement their preferred tax policy ($\tau = 0$), which prevents any redistribution. For $\chi \in \left(1/2, \frac{1}{1+\left(\frac{y_L}{y_H}\right)^{\sigma}}\right)$, we have an interior solution for the equilibrium tax rate given by:

$$\tau^* = \frac{y_H - \frac{\bar{y}}{\delta+(1-\delta)B}}{y_H - \bar{y}} \tag{14}$$

We are now ready to prove some comparative static results in this basic environment. Given that taxation is frictionless in every sense, when the poor have sufficient political power ($\chi < 1/2$) they are able impose $\tau^* = 1$, so full equalization of after-tax incomes is achieved. Even though a minority, when the rich have relatively high political power they are able to reduce the redistributive burden of fiscal policy. Anyhow, higher inequality is always associated with higher tax rates, resembling the standard result in political economy models *à la* Meltzer and Richard (1981). Regarding the relation between the level of democratization and fiscal policy, this simple setting predicts higher tax rates in more democratic societies, i.e societies in which policy outcomes are closer to the principle of *one person one vote*. The following propositions formally prove these results.

Proposition 6. *The equilibrium tax rate (τ^*) is non-decreasing in the level of inequality.*

Proposition 7. *The equilibrium tax rate (τ^*) is non-increasing in the level of political power of the rich (χ).*

Let us now introduce the possibility of tax evasion, in the same way as in section 2.2 above. The equilibrium tax rate in this case is given by the solution to maximizing (12) subject to the participation (non-evasion) constraint of the rich ($\bar{V}(\tau) \geq \bar{V}^e$). There are two situations in which the non-evasion constraint for the rich will not bind. First, when audit and penalty rates are sufficiently high, the right hand side of the constraint is very small, and tax evasion is not optimal even if $\tau = 1$. I will assume this is not the case, so tax evasion is a potential option. Second, when the rich have sufficiently high political power and they are able to impose a low tax rate at which their utility in case of compliance is higher than the expected utility of evasion. In these two cases we would be in an environment equivalent to the one in the previous case, and propositions 6 and 7 carry forward unchanged.

When the political power of the rich, the audit rate and the penalty rate are not too high, the participation constraint for the rich will bind, and the equilibrium tax rate will solve $\bar{V}(\tau) = \bar{V}^e$. We are therefore in the same scenario as in section 2.2, and the equilibrium tax rate is therefore given by proposition 1. The next proposition formally states that higher inequality leads to a reduction in the equilibrium tax rate, when the political power of the rich is below a threshold $\bar{\chi}$.

Proposition 8. *There exists $\bar{\chi}$ such that for any $\chi \leq \bar{\chi}$, an increase in inequality decreases the equilibrium tax rate (τ^*).*

It is straightforward to prove a result as the one in proposition 7 in this setting, stating that the equilibrium tax rate is non-decreasing in the political power of the rich, for a given level of inequality. It can be shown as well that the equilibrium tax is increasing in the audit and penalty rates for $\chi \leq \bar{\chi}$, as a better enforcement technology reduces the expected utility of evasion allowing the poor to increase the resources extracted from the rich through fiscal policy.

Finally, introducing social mobility in the same way as in section 2.3, we can show that mobility is positively related to the tax rate, and inequality produces opposing effects on tax rates depending on how mobile the society is. The next propositions prove these results.

Proposition 9. *For any $\chi \in [0,1]$, the equilibrium tax rate (τ^*) is increasing in the level of social mobility $(1-\pi)$.*

Proposition 10. *There exists π^* such that:*

(i) If $\pi \leq \pi^*$, an increase in inequality increases the equilibrium tax (τ^*).

(ii) If $\pi > \pi^*$, there exists $\bar{\chi}$ such that an increase in inequality increases the equilibrium tax (τ^*) when $\chi > \bar{\chi}$, and decreases the equilibrium tax (τ^*) when $\chi \leq \bar{\chi}$.

Summarising, as long as the political power of individuals born to rich families is not too large, the results proven in section 2 under the assumption of a perfectly democratic process carry forward to a setting that deviates from the principle of *one person one vote*.

3.2 General Distribution of Family Types

Think of an environment equivalent to the one in section 2.3, but instead of only two types of families, there is a lognormal distribution of family types Y_0, so that $\log Y_0 \sim N(\mu_{Y_0}, \sigma^2_{Y_0})$. Let $f_{Y_0}(y_0)$ denote the density function of Y_0. One individual is born into each family. The actual endowment of each individual is determined by his family type (y_0^i) and an idiosyncratic shock (z^i), which also follows a lognormal distribution Z such that $\log Z \sim N(\mu_z, \sigma_z^2)$. Let $f_Z(z)$ denote the density function of Z. Thus, the ex-post endowment distribution $Y = Y_0 + Z$ satisfies $\log Y \sim N(\mu_{Y_0} + \mu_z, \sigma^2_{Y_0} + \sigma^2_z)$. The position in the family distribution is known to the individual at the beginning of time, but the specific shock is only known after the vote on tax rates and the compliance-evasion decision have taken place. Therefore, each individual knows his endowment only imperfectly when he has to make his decisions. We can use $m = \frac{\sigma_z^2}{\sigma_Y^2}$ as a measure of mobility. Notice that when $m = 0$ mobility is non-existent, as every individual knows perfectly his endowment before the voting process. Instead, when $m = 1$ no individual has any ex-ante information about his future endowment and mobility is the highest.

Assume the political system is perfectly democratic, so the individual with median family type is the decisive voter, and the equilibrium tax rate will be the most beneficial tax for him. Anyhow, he needs to take into account the fact that some individuals will evade taxes, reducing total tax revenue and thus the amount of the transfer. For a given tax rate τ, there will be a cut-off family type $\tilde{y_0}$ such that every individual with $y_0^i > \tilde{y_0}$ will opt for evasion, while individuals with $y_0^i \leq \tilde{y_0}$ will decide to comply. For a given tax, $\tilde{y_0}$ will solve the participation constraint with strict equality, $V(\tilde{y_0},\tau)=V^e(\tilde{y_0})$, so:

$$\int U\left((1-\tau)(\tilde{y_0}+z)+T(\tilde{y_0})\right)f_Z(z)dz=\int \theta U((1-\eta)(\tilde{y_0}+z))+(1-\theta)U(\tilde{y}+z)f_Z(z)dz \tag{15}$$

Where:

$$T(\tilde{y_0})=\frac{\displaystyle\int_0^{\tilde{y_0}}\tau y_0 f_{Y_0}(y_0+z)dy_0+\int_{\tilde{y_0}}^{\infty}\theta\eta y f_{Y_0}(y_0+z)dy_0}{\displaystyle\int_0^{\tilde{y_0}}f_{Y_0}(y_0)dy_0} \tag{16}$$

Notice that in this case, the lump-sum transfer $T(\tilde{y_0})$ is the sum of the taxes voluntarily paid and the revenue collected through audits, divided by the fraction of the population who did not evade taxes. A politico-economic equilibrium in this environment is defined as:

Definition 2 (Politico-Economic Equilibrium). *An equilibrium is a function $\tilde{y_0}(\tau)$, a set of private economic decisions ρ^i $\forall i$, and a tax policy τ^*, such that:*

1. *The function $\tilde{y_0}(\tau)$ solves $V(\tilde{y_0},\tau)=V^e(\tilde{y_0})$.*
2. *The decision of whether to comply or evade taxes (ρ^i) is optimal for every individual.*
3. *The tax rate (τ^*) cannot be defeated by any alternative in a majority vote.*

Once the function $\tilde{y_0}(\tau)$ has been obtained, the equilibrium tax rate solves the problem of the individual with median family type (y_0^m):

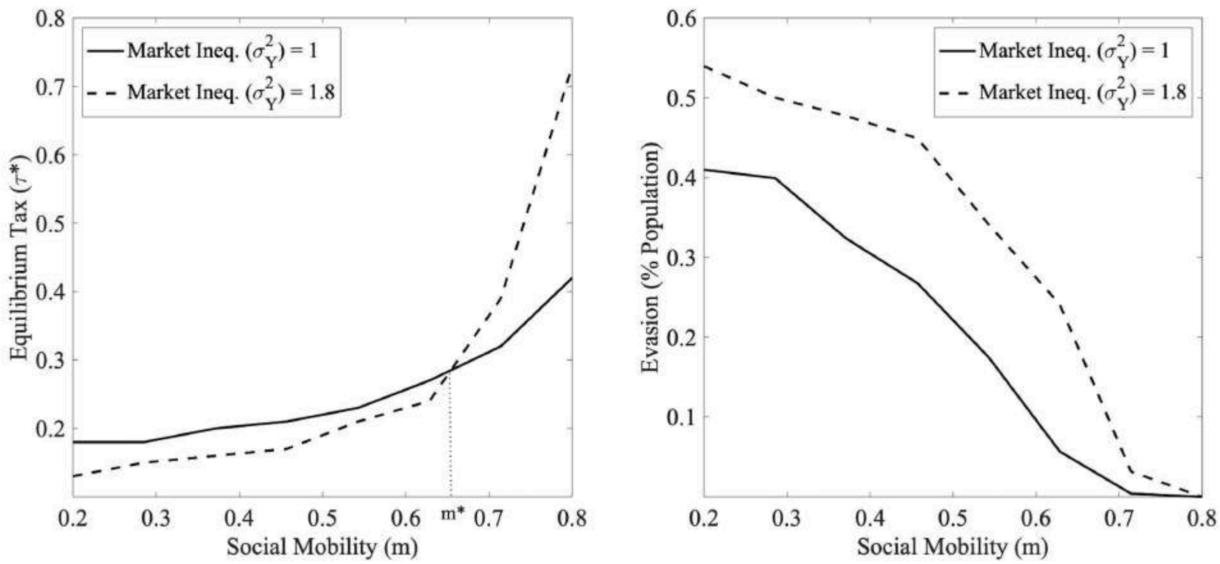
$$\tau^*=\arg\max_{\tau}\int U\left((1-\tau)(y_0^m+z)+T(\tilde{y_0}(\tau))\right)f_Z(z)dz \tag{17}$$

We can again analyze the effects of changes in social mobility on equilibrium tax rates and redistribution. I present a numerical example in which I solve for the function $\tilde{y_0}(\tau)$ and the equilibrium tax (τ^*). The results of this exercise are depicted in figure 3 (left). In a similar fashion as in the two type model, higher social mobility favors the tax enforcement process, making evasion less desirable and participation in the tax and transfer system more attractive, as it provides valuable risk insurance. Therefore, the equilibrium tax rate (τ^*) is increasing in the level of social mobility (m) for a given level of inequality. This can be observed in the solid line of the left plot in figure 3, which shows how the equilibrium tax is an increasing function of mobility when keeping inequality constant.

The result in proposition 5 is also clear in the figure. The solid line depicts the equilibrium tax rates for different levels of social mobility, for a given level of inequality[12]. The dotted line shows the results when inequality increases. If social mobility is lower than the cutoff level m^*, the increase in inequality leads to a decrease in equilibrium taxes, while for relatively high levels of mobility (above m^*), higher inequality produces an increase in taxation. The intuition for this result is the same as in the case of just two types. The only difference now is that, in equilibrium, a positive measure of individuals evades taxes (those with

[12] I use σ_Y^2 as my inequality measure. An increase in this statistic unambiguously shifts the Lorenz curve outwards and therefore increases the Gini coefficient.

Figure 3: Inequality, Equilibrium Tax and Evasion



Note: Figures generated for $\sigma = 1$, $\theta = 0.2$, $\eta = 0.4$, $\mu_Y = \mu_{Y_0} = \log 15$, $\sigma^2_Y = 1$, $\mu_z = 1$.

family type above $\tilde{y_0}$). Thus, it is possible to analyze the comparative static effects of inequality on the aggregate level of evasion in the economy. Figure 3 (right) shows this effect for different levels of social mobility. As expected, evasion is a decreasing function of social mobility for a given level of inequality, measured as a fraction of the population who evades taxes (solid line).[13] When inequality increases (dashed line), so does evasion for every level of mobility, which is in line with the intuition presented above. In highly mobile societies, higher inequality does not push a lot of individuals into tax evasion, allowing for the implementation of higher fiscal pressure. On the contrary, when social mobility is low, higher inequality has strong effects on the evasion incentives and pushes the relatively poor majority to reduce tax rates to mitigate this movement.

4 Empirical Analysis

In this section I empirically analyze the main propositions of the theoretical model using a sample of 72 countries of all income levels for the period 1960-2015. In particular, the prediction formalized in proposition 5 that the relation between (market) inequality and redistribution is unambiguously positive when social mobility is high, while is substantially ameliorated or even turns negative when mobility is relatively low; and the result of proposition 4 of a positive relation between social mobility and redistribution for a given level of market inequality. I present results using two approaches: the first takes a long run perspective based

[13]The results are similar when analyzing the share of aggregate income evaded.

on averages of the variables for extended periods of time and cross-sectional OLS estimation; the second uses panel techniques (i.e. System-GMM estimation) that also capture within-country variation of the data, with a medium term viewpoint. In both cases, the estimation results give consistent support for the comparative statics of the model, reinforced by a battery of robustness and sensitivity checks.

4.1 Data Sources and Preliminary Evidence

In order to test the predictions of the model, the main difficulty lies in the scarcity of social mobility data suited for an international cross-sectional analysis. The literature on social mobility has focused on the estimation of the intergenerational elasticity of income (IGE) at a national level, for those countries for which long panels covering at least two generations are available[14]. Nevertheless, these country-specific estimates are not directly comparable as they differ in methodology, underlying data, period of analysis, etc. After analyzing the technical details of a variety of studies, Corak (2006) reports comparable IGE estimates for a group of only 26 countries. Given the small size of this sample, I turn to indirect estimates of social mobility for the baseline estimations of the paper, and only use Corak's sample as a robustness check. The World Bank has recently published the Global Database on Intergenerational Mobility (GDIM (2018)), which compiles data on intergenerational mobility of educational attainment for a vast number of countries.[15] Using a two-sample two-stage least squares approach, they also estimate the intergenerational elasticity of income for a total of 75 countries. Notice that this is a measure of social immobility (higher values imply lower mobility), so in order to minimize confusion I compute $(1 - IGE)$ and use it as my measure of social mobility. This variable is the empirical counterpart of $(1 - \pi)$ in the theoretical model, capturing the extend to which an individual's income is determined by that of his family. In some robustness checks I also make use of the GDIM estimates on intergenerational persistence in educational attainment (IGP), defined in a similar way as IGE (the coefficient of regressing the child's level of education on that of her parents).

I use data on inequality from the the Standardized World Income Inequality Database (SWIID) gathered by Solt (2019), which provides comparable Gini coefficients for a large number of countries and years. This database clearly differentiates between pre (market) and post (net) taxes and transfers inequality, which is crucial to test the mechanism of the theoretical model. This feature makes the SWIID database preferable to other sources of inequality data regarded as of higher quality, such as the Luxembourg Income Study, for which market income inequality is available for a much smaller number of countries. I use the market Gini coefficient as independent variable, and for the outcome variable I use either the net Gini coefficient,

[14] Intergenerational Elasticity of Income is defined as the coefficient resulting from regressing childs earnings on parents earnings. See Fields and Ok (1999) and Jantti and Jenkins (2013) for a comprehensive analysis of the different theoretical measures of social mobility.

[15] The GDIM uses survey data which covers around 90% of the population born in 1980 for the countries included in the database, and records the educational level after 2006, ensuring that the final level of education of an individual is accurately captured. See Narayan et al. (2018) for a detailed explanation of the dataset.

absolute, or relative redistribution.[16] The mechanism of the theoretical models in sections 2.3 and 3.1 rely on a median voter argument, and therefore it is important to control for a measure of democratic institutions that can capture the extent to which the preferences of the majority translate into fiscal policy. I use the average democracy score from the Polity IV dataset (variable named *Polity2*), which ranges from -10 (most autocratic regime) to 10 (most democratic). The empirical literature has consistently used other controls such as the level of GDP per capita, the share of population above 65 years old, or regional dummies. I present results including these variables, which I obtain from the Penn World Table v. 9.1 (Heston et al. (2012) and the World Development Indicators.[17]

Table 1: List of Countries

Country classification	Countries
Low income (10)	Benin, Ethiopia, Guinea, Madagascar, Malawi, Mali, Nepal, Rwanda, Tanzania, Uganda
Lower middle income (14)	Bangladesh, Bolivia, Egypt, Ghana, India, Kenya, Kyrgyzstan, Mongolia, Morocco, Nigeria, Pakistan, Tunisia, Uzbekistan, Vietnam
Upper middle income (15)	Albania, Belarus, Bosnia and Herzegovina, Brazil, China, Colombia, Ecuador, Guatemala, Jordan, Kazakhstan, Macedonia, Malaysia, Peru, Russia, South Africa
High income (33)	Australia, Austria, Belgium, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Latvia, Luxembourg, Netherlands, New Zealand, Norway, Panama, Portugal, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States

Note: List of 72 countries included in the baseline regressions, classified by income category according to the World Bank criteria. Albania, Benin, and Bosnia and Herzegovina are not included in the cross-sectional estimations due to lack of availability of market or net Gini data for the period of analysis.

Table 1 describes the list of countries for which the necessary data is available. Table 2 presents summary statistics for the variables used in the cross-sectional and panel empirical analysis below. Column 2 of table 2 reports the time periods for which the annual observations have been averaged for each variable, motivated by the different specifications analyzed and their potential estimation threats explained in the following sections. Table 3 shows simple and conditional correlations between market inequality and different outcome variables, using the cross-section and panel samples. Column (2) reports the correlation of market and net inequality. The simple correlation is relatively high in both samples (0.652 and .663 respectively), which points to a clear association between pre and post taxes and transfers inequality. Anyhow, the unconditional correlation conceals the very different results obtained when splitting each sample by its median level of social mobility. The correlation is very high for countries with relatively low levels of mobility (around 0.8) while much lower for high mobility countries (below 0.25), suggesting that redistribution plays a major role

[16] As noted above, previous empirical studies have generally used proxies for redistribution such as aggregate tax revenue or marginal taxes on income, but these measures capture features of the tax system not necessarily redistributive (i.e. tax revenue spent on defense), what makes variables that directly compare inequality before and after taxes and transfers more suitable. Nevertheless, absolute and relative redistribution are highly correlated to measures of aggregate taxation as shown by Ostry et al. (2014) for a large sample of countries.

[17] Data on the share of population above 65 years-old is taken from the World Bank's WDI except for Macedonia and Taiwan, that are taken from the United Nations World Population Prospects 2019 and the National Development Council respectively.

Table 2: Summary Statistics

	Period	Min	Mean	Median	Max	S.D.	Obs.
Cross-Section Data							
Market Gini	1980-1995	28.881	44.098	43.15	66.344	6.805	69
Net Gini	1995-2015	23.919	35.729	33.814	59.595	8.113	69
Absolute Redist.	1995-2015	-2.695	10.105	8.248	23.49	7.154	69
Relative Redist. (%)	1995-2015	-6.609	21.832	15.111	48.772	14.968	69
(1-IGE) (GDIM)	-	-0.095	0.502	0.564	0.887	0.248	69
(1-IGE) (Corak)	-	0.29	0.6	0.59	0.85	0.16	26
(1-IGP) (GDIM)	-	0.185	0.578	0.59	0.849	0.143	66
Democracy	1995-2015	-9	5.451	8	10	5.591	69
log(GDPpc)	1980-1995	6.601	8.82	9.046	10.428	1.15	69
Pop 65+ (%)	1980-1995	2.327	7.874	5.63	17.356	4.617	69
Panel Data							
Market Gini		27.18	45.059	45.12	68.7	6.767	555
Net Gini		17.75	35.26	33.78	59.78	8.809	555
Absolute Redist.	For all	-2.92	9.799	8.36	23.98	6.664	555
Relative Redist. (%)	Variables:	-7.077	21.784	18.889	50.326	14.585	555
(1-IGE) (GDIM)	5-years non-	-0.095	0.488	0.543	0.887	0.25	792
(1-IGE) (Corak)	overlapping	0.29	0.6	0.59	0.85	0.157	275
(1-IGP) (GDIM)	averages for	0.185	0.572	0.579	0.849	0.146	759
Democracy	the period	-10	3.091	6.4	10	7.198	720
log(GDPpc)	1960-2015	6.181	8.807	8.88	11.276	1.228	714
Pop 65+ (%)		1.876	7.937	5.945	23.902	4.853	792

Note: Variable definitions and sources are explained in section 4.1. For social mobility variables (IGE and IGP from GDIM, and Corak's IGE) only one point estimate is available, which is used for all 5-year periods in the panel data.

in compensating increases in market inequality only when social mobility is high. This intuition is more evident in columns (3) and (4), which show the correlation of market inequality with absolute and relative redistribution. In both samples, higher market inequality is only associated with higher redistribution for countries with social mobility above the median, while the relation is close to zero or even negative for countries below that threshold. The scatter plots of figure 4 present a similar intuition. The positive relation between inequality and redistribution is only clear for the subsample of observations above the median level of social mobility (central graphs in each panel). These preliminary results give suggestive support for the hypothesis and theoretical results presented in the previous sections, and motivate the more sophisticated econometric analysis of the following subsections.

4.2 Cross-sectional Estimation

4.2.1 Specification

This section presents least-squares estimates of the mechanism proposed in the model, using a cross-section of countries and long run averages of the variables in the spirit of the early studies of Perotti (1996) and Persson and Tabellini (1994). These papers try to find empirical evidence of the so called *endogenous fiscal policy channel* regarding the effect of inequality on economic growth (i.e. higher inequality would foster higher redistributive taxation, increasing distortions which would harm economic growth). The first leg of

Table 3: SIMPLE AND CONDITIONAL CORRELATIONS

	Conditioning Statement (1)	Correlation w/ Net Ineq. (2)	Correlation w/ Absolute Redist. (3)	Correlation w/ Relative Redist. (4)
Cross-Section Data				
Market Ineq.	None	0.652	-0.003	-0.120
Market Ineq.	Mobility $\geq$ Median	0.182	0.562	0.450
Market Ineq.	Mobility $<$ Median	0.792	-0.071	-0.200
Panel Data				
Market Ineq.	None	0.663	0.140	-0.017
Market Ineq.	Mobility $\geq$ Median	0.249	0.715	0.577
Market Ineq.	Mobility $<$ Median	0.811	-0.006	-0.182

Note: Pearson's correlation calculated using baseline definitions of each variable, as explained in section 4.1. The cross-section correlations are calculated using 69 countries. Market inequality is the average market Gini coefficient for the period 1980-1995; while net inequality (net GINI coef.), absolute and relative redistribution are averages for 1995-2015. Mobility is measured as $(1 - IGE)$ from the GDIM database. The panel correlations are based in 555 observations from a total of 72 countries, where observations are non-overlapping 5-year averages and market inequality leads the other variables for one period.

the mechanism, higher inequality leads to higher redistribution, is found to have little empirical support. After trying different specifications and robustness checks, Perotti concludes that the data show "a very weak, or even non-existing, negative relationship between equality and fiscal variables" (Perotti (1996), p.172). These early studies have evident shortcomings in terms of the quality of the data used, specially on inequality, and the small sample of countries available.[18] Anyhow, their results are not at odds with the theoretical predictions of my theoretical model: if social mobility is not taken into account, an insignificant relation between inequality and redistribution is to be expected as countries with low mobility will shift the estimates downward, as can be observed in the upper left plot in figure 4. In order to capture the differential effect of inequality on redistribution depending on the level of social mobility, I estimate an interaction term model given by:

$$y_i = \beta_0 + \beta_1 GINI_i^{mkt} + \beta_2(1 - IGE_i) + \beta_3 \left(GINI_i^{mkt} \cdot (1 - IGE_i)\right) + \Omega' X_i + \nu_i$$

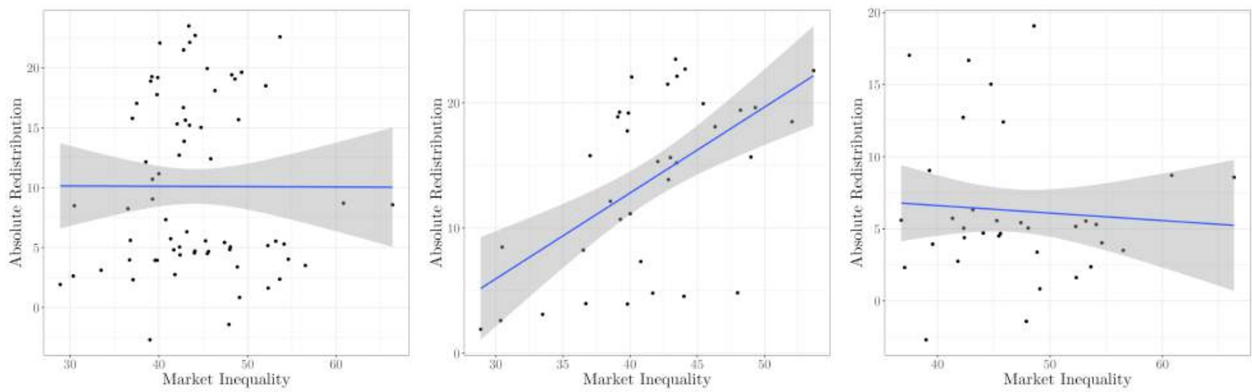
Where $i = 1, 2, ..., N$ denotes a particular country. In the baseline results presented below, the dependent variable (y_i) will be either the net Gini coefficient or Absolute Redistribution. The right hand side includes the level of market inequality and social mobility separately, and an interaction term between them. The column vector X_i includes values for other explanatory variables that may also affect the level of redistribution. The error term is given by ν_i.

The biggest concern in the estimation of the equation above is the potential endogeneity of both inequality and social mobility with respect to the outcome variable. It can be argued that redistributive policies have the objective of reducing inequality and promoting social mobility, and thus the proposed specification would

[18] Perotti constructs a measure of inequality based on the share of the middle class from distributional data reported by Jain and Jain (1975) and Lecaillon et al. (1984), while Persson and Tabellini use a variety of sources to obtain a measure of the share of pre-tax income of the top 20% of the population. The lack of adequate data restricts the estimations to less than 50 countries in the case of Perotti's work, and only 13 in the study of Persson and Tabellini.

Figure 4: Inequality and Redistribution by Level of Mobility

(a) Cross-Section Data



Full Sample — Mobility $\geq$ Median — Mobility $<$ Median

(b) Panel Data

Full Sample — Mobility $\geq$ Median — Mobility $<$ Median

Note: For the cross-sectional data of panel (a), each dot represents a country. Market inequality is the average market Gini coefficient for the period 1980-1995; absolute redistribution (market Gini minus net Gini) is the average for 1995-2015. In panel (b), each dot represents a period-country observation, where periods are averages of each variable for 5 non-overlapping years, and market inequality leads one period. Mobility is measured as $(1 - IGE)$ from the GDIM database. Blue lines are linear regression lines and grey bands show 90% confidence intervals.

present a problem of reverse causality. In order to address this challenge, market inequality is predated with respect to the outcome variable. The former is given by the average for the period 1980-1995, while the latter is the average between 1995-2015. Regarding social mobility, the available data only offers one point estimate per country. The limited evidence on the behavior of mobility across time, based on US data, points to a flat trend (Lee and Solon (2009), Chetty et al. (2014)), which mitigates the concerns of a possible reverse effect of redistribution on mobility. As the latter put it, "the rungs of the ladder have grown further apart, but children's chances of climbing from lower to higher rungs have not changed" (p. 141). Another potential concern is the collinearity between inequality and social mobility, based on the evidence of a "Great

Gatsby Curve" reported by Corak (2013a). While the correlation between net inequality and social mobility is also high for the international cross-section sample (-0.735), this value is reduced to -0.433 for market inequality, which is the measure of inequality used in the regressions. Finally, the potential troubles coming from the omission of other determinants of disposable income inequality or redistribution is dealt with by the introduction of different regressors that control for political, institutional, demographic or regional factors included in X_i.

4.2.2 OLS Results

Tables 4 presents robust least-squares results for the baseline specification. The only difference between panels A and B is the dependent variable (net Gini and absolute redistribution respectively). Column (1) only includes market inequality as a regressor. The association between market and net Gini (panel A) is highly significant, positive, and close to 0.8. The relation between market Gini and absolute redistribution (panel B) is not different from 0. These two results resemble the findings of the early empirical studies mentioned above: when social mobility is not considered, higher market inequality does not imply higher levels of redistribution, and net inequality increases almost one for one. Column (2) includes social mobility and its interaction with market inequality, but no additional controls. The coefficient on interaction term is highly significant and has the expected sign in both panels. In panel A, the marginal effect of an increase in market inequality on net inequality ($\beta_1 + \beta_3 \cdot (1 - IGE_i)$) ranges from close to 1 for the observations with the lowest level of social mobility, to close to 0 for the most mobile country. That is, a given increase in market inequality translates to an almost equivalent increase in net inequality when social mobility is extremely low, and is almost completely compensated by redistribution (no change in net Gini) when social mobility is very high. The results of column (2) of panel B corroborates this interpretation. Columns (3) through (5) introduce additional controls sequentially. First, an index of democratic institutions, then GDP per capita (in logs), and finally the share of the population above 65 years old. The signs and significance of the coefficients on inequality and the interaction term are very similar to those in column (2), but the magnitudes differ in some cases. Most notably, the point estimates in columns (3) and (4) in each panel imply that for low levels of mobility, a one Gini-point increase in market inequality can decrease absolute redistribution and therefore produce a rise in net inequality of more than one Gini-point. Column (5), which is the preferred specification, and the closest to Perotti's, reduces the predicted interaction effect around 50%, but maintains the interpretation and significance levels of the previous columns. Finally, column (6) is equivalent to (5) but includes regional dummies. In line with previous research, this change reduces dramatically the significance and magnitude of the relation between inequality and redistribution (panel B). Regional dummies also turn insignificant the interaction term coefficient in both panels. This result points to an important shortcoming of cross-sectional estimation, that does not consider country-specific characteristics that may influence the level of redistribution, and motivates the use of panel methods that

Table 4: OLS Baseline Results

Panel A. Net Gini as Dependent Variable

	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	0.777***	0.963***	1.205***	1.285***	0.897***	0.687***
	(0.106)	(0.225)	(0.220)	(0.181)	(0.179)	(0.264)
$(1-IGE)$		26.334	39.670**	52.548***	24.088*	4.295
		(17.235)	(18.289)	(14.162)	(14.408)	(16.492)
$GINI^{mkt} * (1-IGE)$		-0.976***	-1.185***	-1.367***	-0.702**	-0.272
		(0.366)	(0.378)	(0.293)	(0.305)	(0.367)
Democracy			-0.374***	-0.158	-0.023	-0.223**
			(0.121)	(0.128)	(0.113)	(0.092)
log(GDPpc)				-2.329***	0.026	0.516
				(0.601)	(0.694)	(0.736)
Population 65+					-0.849***	-0.351*
					(0.155)	(0.195)
Regional Dummies	No	No	No	No	No	Yes
Observations	69	69	69	69	69	69
Adjusted R^2	0.416	0.690	0.738	0.793	0.841	0.874

Panel B. Absolute Redistribution as Dependent Variable

	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	-0.003	-0.253	-0.579***	-0.694***	-0.146	0.089
	(0.111)	(0.231)	(0.219)	(0.139)	(0.136)	(0.165)
$(1-IGE)$		-33.487*	-51.452***	-69.913***	-29.748**	-12.276
		(19.729)	(19.927)	(13.552)	(12.299)	(12.613)
$GINI^{mkt} * (1-IGE)$		1.183***	1.465***	1.726***	0.788***	0.357
		(0.422)	(0.421)	(0.288)	(0.271)	(0.263)
Democracy			0.503***	0.194*	0.003	0.150**
			(0.125)	(0.114)	(0.075)	(0.073)
log(GDPpc)				3.339***	0.015	-0.070
				(0.512)	(0.536)	(0.592)
Population 65+					1.199***	0.738***
					(0.142)	(0.187)
Regional Dummies	No	No	No	No	No	Yes
Observations	69	69	69	69	69	69
Adjusted R^2	-0.015	0.439	0.553	0.703	0.829	0.861

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Regional dummies according to the 7-region World Bank classification.

can account for this problem. The coefficients on the controls have the expected signs: more democratic institutions are associated with higher redistribution and lower net inequality, richer countries redistribute more and therefore have lower levels of disposable income inequality, and a higher share of older population is strongly associated with higher redistributive taxation. It is worth mentioning that in both panels, column (4) shows a strong and significant predicted effect of GDP per capita, that vanishes when controlling for the share of population above 65 years old, which is due to the strong correlation of both variables (0.85).

4.2.3 Sensitivity and Robustness (OLS Estimation)

Table 5 presents a series of sensitivity and robustness exercises for the baseline cross-sectional results. For each departure from the baseline specification, I report the coefficients and robust standard errors for inequality and the interaction term for the models in columns (4)-(6) of table 4, using net inequality as dependent variable unless otherwise specified.[19] In general, the main results are not overturned by any of them, but in some cases particular coefficients lose significance. First, given that the sample is not too large, I deal with the possibility that the results are driven, or seriously influenced, by outliers. First, I remove the observations with the three highest and lowest values of net inequality, market inequality, and social mobility (panel A in table 5). In all three cases, as long as regional dummies are not included both coefficients are significant and have the same signs and similar magnitudes as in the baseline estimations. Including regional dummies turns the interaction term coefficient insignificant, just as in table 4. I replicate the specification of column (5) in table 4.A taking one observation out at a time. The coefficient on the interaction term is always highly significant (minimum p-value is 0.054) and its magnitude varies between -0.5 and -0.8, in line with the baseline estimation of -0.702.[20] I address potential concerns regarding variable definitions and measurement assessing the sensitivity of the baseline results to changes in the definition of the crucial variables. In particular, table 5.B presents the results of reestimating the model using: relative redistribution as a dependent variable, intergenerational persistence in educational attainment (1-IGP) from the GDIM database as a measure of social mobility, and the data on IGE gathered by Corak (2013b). The signs and magnitudes of the coefficients on inequality and the interaction term are similar to those in table 4, and only lose significance when using IGP as a measure of mobility and democracy, GDP per capita and share of population above 65 years old as controls. [21] Finally, I check the sensitivity of the baseline results to changes in the cutoff years used to average variables. First, I run the analysis calculating averages for all variables (dependent and independent) for the period 1980-2015. The regression results are very similar to those in the baseline specification in terms of signs but slightly bigger in absolute value. Furthermore, the interaction term coefficient is significant even when including regional dummies. I also estimate the model setting the

[19] The complete tables for all the sensitivity and robustness checks can be found in Appendix B (Tables B.1-B.4).

[20] The results of this exercise are not reported in table 5 in order to economize space, but histograms of the interaction coefficient and its p-value are included in Appendix B (figure B.1).

[21] Notice that the number of observations drops to only 26 when using Corak's data on IGE.

Table 5: Sensitivity (OLS Estimation)

	Inequality		Interaction			Regional	# of
	Coeff.	S.E.	Coeff.	S.E.	Controls	Dummies	Countries
5A. Removing Outliers							
Net Gini Outliers	1.151***	0.178	-1.329***	0.275	Dem, GDPpc	No	63
Net Gini Outliers	0.786***	0.191	-0.664*	0.342	Dem, GDPpc, Pop65+	No	63
Net Gini Outliers	0.348*	0.194	0.097	0.285	Dem, GDPpc, Pop65+	Yes	63
Market Gini Outliers	1.055***	0.176	-1.072***	0.299	Dem, GDPpc	No	63
Market Gini Outliers	0.743***	0.191	-0.607*	0.350	Dem, GDPpc, Pop65+	No	63
Market Gini Outliers	0.298	0.185	0.241	0.278	Dem, GDPpc, Pop65+	Yes	63
Social Mobility Outliers	1.269***	0.209	-1.305***	0.384	Dem, GDPpc	No	63
Social Mobility Outliers	0.950***	0.209	-0.810**	0.393	Dem, GDPpc, Pop65+	No	63
Social Mobility Outliers	0.659**	0.299	-0.214	0.462	Dem, GDPpc, Pop65+	Yes	63
5B. Changing Variable Definitions							
Relative Redist.	-1.573***	0.332	3.314***	0.708	Dem, GDPpc	No	69
Relative Redist.	-0.412	0.312	1.327***	0.575	Dem, GDPpc, Pop65+	No	69
Relative Redist.	-0.006	0.385	0.510	0.612	Dem, GDPpc, Pop65+	Yes	69
(1-IGP)	1.482***	0.366	-1.381**	0.570	Dem, GDPpc	No	66
(1-IGP)	0.823***	0.291	-0.398	0.458	Dem, GDPpc, Pop65+	No	66
(1-IGP)	0.645	0.424	-0.143	0.601	Dem, GDPpc, Pop65+	Yes	66
(1-IGE) (Corak)	1.165***	0.249	-1.523**	0.647	Dem, GDPpc,	No	26
(1-IGE) (Corak)	0.741***	0.238	-1.073*	0.580	Dem, GDPpc, Pop65+	No	26
(1-IGE) (Corak)	0.133	0.321	0.063	0.690	Dem, GDPpc, Pop65+	Yes	26
5C. Changing Averaging Periods							
1980-2015 All vars.	1.603***	0.154	-1.739***	0.263	Dem, GDPpc	No	72
1980-2015 All vars.	1.183***	0.136	-1.000***	0.249	Dem, GDPpc, Pop65+	No	72
1980-2015 All vars.	0.996***	0.185	-0.578**	0.282	Dem, GDPpc, Pop65+	Yes	72
80-85 Dep., 85-2015 Indep.	1.309***	0.218	-1.316***	0.297	Dem, GDPpc	No	48
80-85 Dep., 85-2015 Indep.	0.899***	0.220	-0.634*	0.348	Dem, GDPpc, Pop65+	No	48
80-85 Dep., 85-2015 Indep.	0.714**	0.288	-0.254	0.393	Dem, GDPpc, Pop65+	Yes	48
80-90 Dep., 90-2015 Indep.	1.286***	0.158	-1.321***	0.248	Dem, GDPpc	No	63
80-90 Dep., 90-2015 Indep.	0.913***	0.167	-0.672**	0.289	Dem, GDPpc, Pop65+	No	63
80-90 Dep., 90-2015 Indep.	0.697***	0.228	-0.285	0.321	Dem, GDPpc, Pop65+	Yes	63

Note: Robust standard errors for the inequality and interaction term. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels.

cutoff date for the right-hand side variables in 1985 and 1990, again not finding relevant differences.

Overall, the results of table 4 are robust to different specifications and sensitivity checks, and in line with the main prediction of the theoretical model. Anyhow, the significance of the results decay when introducing regional dummies, which points to the importance of taking into account country-specific characteristics in the analysis of the effects of inequality on other macroeconomic variables, that motivates the use of panel econometric techniques as those presented in the next section.

4.3 Panel Estimation

4.3.1 Specification

Early cross-sectional estimations have been criticized by the literature for two main reasons (Forbes (2000)). First, because they do not control for specific country characteristics and are therefore subject to an omitted variable bias. Second, measurement error especially on income distribution variables. The increased availability and quality of distributional data during the last two decades has made standard the use of panel econometric techniques in order to address these concerns.[22] The results presented in the previous section are subject to those same critiques, especially regarding the omitted variable bias. Consequently, I follow the literature and carry out a panel econometric analysis in order to check whether the previous results are strengthen using such estimation techniques. The dynamic equation to be estimated is given by:

$$y_{i,t} = \beta_1 GINI_{i,t-1}^{mkt} + \beta_2 \left(GINI_{i,t-1}^{mkt} \cdot (1 - IGE_i)\right) + \Omega' X_{i,t-1} + \alpha_i + \eta_t + \nu_{i,t}$$

Where $i = 1, 2, ..., N$ denotes a particular country and $t = 1, 2, ..., T$ denotes non-overlapping 5-year averages for the period 1960-2015. The dependent variable (y_i) will again be either the net Gini coefficient or Absolute Redistribution. The right hand side includes the market Gini coefficient lagged one period, as well as interacted with the level of social mobility. Notice that social mobility only enters in the empirical specification interacted with the level of market inequality, given that the dataset only contains one observation per country and the additive term is fully absorbed by the country fixed effects.[23] The column vector $X_{i,t-1}$ denotes again the set of controls, now lagged one period. The country and time specific effects (α_i and η_t) capture country characteristics that are constant over time and shocks common to all countries respectively. The error term is given by $\nu_{i,t}$. The choice of 5-year periods and lagged independent variables is made in order to facilitate the comparability with previous literature. Estimations using 10-year periods and contemporaneous regressors are reported as robustness checks.

The usual panel estimation methods of pooled-OLS, Fixed Effects or first-difference transformations are unlikely to provide consistent estimates, especially when the number of time periods T is small (Bond et al. (2001)). Besides the omitted variable bias of pooled-OLS, these methods are subject to the "dynamic panel bias" described by Nickell (1981). Furthermore, when the outcome variable considered is absolute redistribution, the model presents a lagged depended variable (market inequality) which further exacerbates the inconsistency of the within-group estimation.[24] To deal with these problems, the literature has developed two transformations that are commonly used. First-difference GMM estimation (Arellano and Bond (1991)) removes the unobserved time-invariant effect by differentiating the variables, and uses sufficiently lagged values as instruments.[25] While adequately handling the problems of unobserved heterogeneity and lagged dependent variables, the first-difference GMM estimator might not be appropriate in this context for two reasons. First, because most of the variation of the data comes from differences between countries, which

[22] See Aleman and Woods (2018), Ostry et al. (2014) or Grndler and Scheuermeyer (2018) in the context of the inequality-redistribution relationship; and Banerjee and Duflo (2003), Voitchovsky (2005) and Halter et al. (2014) regarding the inequality-growth link.

[23] The additive term is only included in the pooled OLS estimation reported in table 8 below, which lacks country (and time) fixed effects.

[24] The potential bias arises due to the correlation between the transformed error term and the transformation of the lagged depended variable.

[25] The choice of the adequate lag structure for the instrument set is not trivial, and depends on the believed endogeneity (correlation with current errors) of each variable (Roodman (2009a)).

is removed by the first-difference transformation, and not from differences across time for the same country (within variation). Second, because when the variables are highly persistent within countries, as is expected in this case, estimates might be imprecise and biased due to weak instrumentation.[26] Therefore, the baseline results presented below rely on the System-GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), which uses additional moment conditions based on the level equation using lagged differences as instruments, and so exploiting cross-country variation. The choice of instruments is again relevant for the efficiency of the estimation, as noted by Roodman (2009a), given that the number of available instruments is quadratic in T and an unrestricted set of instruments can lead to over-fitting bias due to instrument proliferation. To deal with this issue I follow Roodman (2009b), and combine a reduced lag structure (instead of all available lags) with a collapsed instrument matrix, which ensures that the instrument count is invariant in T.[27] For the System-GMM estimations to be valid, the crucial Arellano and Bover (1995) conditions must also be satisfied, so the tables below report the standard Sargan-Hansen test for over-identifying restrictions, which assesses the validity of the full instrument set, as well as serial-correlation tests to check the absence of second-order autocorrelation. Finally, the baseline results are computed using the more efficient two-step variant of the System-GMM estimation, but the one-step results are reported as a robustness check.

4.3.2 System-GMM Results

The baseline results of the System-GMM estimations are presented in table 6. Panel A uses net Gini as a dependent variable, while panel B uses absolute redistribution. The two panels are equivalent in every other dimension. In both cases, regressors are introduced sequentially to clearly show their contribution. Consider first panel A. Column (1) only includes market inequality as explanatory variable, which is not significant. Column (2) includes the interaction term between market inequality and social mobility. Both coefficients are highly significant, and their magnitudes and signs are in line with the predictions of the theoretical model: For the lowest level of mobility in the sample, the marginal effect of a one Gini-point increase in market inequality on net inequality is close to one, while for the highest level of mobility this effect is cut in half. That is, societies with higher social mobility counteract increases in market inequality through higher redistribution, so net inequality does not rise one for one. Columns (3)-(5) include additional controls sequentially, but the results are very similar to those in column (2). Columns (1)-(5) in panel B present a similar picture: higher market inequality does not increase the level of absolute redistribution for very low levels of social mobility, but as mobility increases so does the change in redistribution, up to compensating around half of the increase in market inequality when social mobility is the highest.

[26] The discussion on the efficiency and adequacy of different estimation methods summarized here is analyzed in detail in Kraay (2015) and Bazzi and Clemens (2013).

[27] For the baseline specification I use as instruments only lags 2:4 for inequality and lags 1:2 for the rest of the regressors. Results obtained relaxing these restrictions are reported as a robustness check.

Table 6: System-GMM Baseline Results

Panel A. Net Gini as Dependent Variable

	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	1.967	1.199***	1.286***	1.326***	1.307***	1.037***
	(1.775)	(0.204)	(0.199)	(0.128)	(0.137)	(0.179)
$GINI^{mkt} * (1 - IGE)$		−0.555***	−0.588***	−0.710***	−0.674***	
		(0.122)	(0.124)	(0.124)	(0.110)	
Democracy			0.008	−0.007	−0.013	−0.037
			(0.021)	(0.018)	(0.024)	(0.044)
log(GDPpc)				1.263***	1.269***	0.076
				(0.316)	(0.463)	(1.193)
Population 65+					−0.236	−0.743***
					(0.163)	(0.276)
N. Countries	72	72	72	72	72	72
N. Observations	411	411	399	398	398	398
Hansen p-val	0.795	0.351	0.733	0.975	0.598	0.001
M1 p-val	0.27	0.911	0.547	0.347	0.345	0.146
M2 p-val	0.643	0.183	0.117	0.088	0.178	0.814

Panel B. Absolute Redistribution as Dependent Variable

	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	−2.458	0.003	−0.093	−0.115	−0.181	−0.062
	(3.514)	(0.226)	(0.236)	(0.225)	(0.120)	(0.147)
$GINI^{mkt} * (1 - IGE)$		0.450*	0.533**	0.525***	0.388**	
		(0.234)	(0.214)	(0.195)	(0.195)	
Democracy			−0.022	−0.025	−0.014	−0.017
			(0.030)	(0.027)	(0.019)	(0.021)
log(GDPpc)				−0.097	−0.431	0.116
				(0.499)	(0.599)	(0.406)
Population 65+					0.496	0.883***
					(0.321)	(0.205)
N. Countries	72	72	72	72	72	72
N. Observations	411	411	399	398	398	398
Hansen p-val	0.916	0.08	0.169	0.132	0.106	0.001
M1 p-val	0.471	0.015	0.01	0.004	0.006	0
M2 p-val	0.511	0.723	0.816	0.94	0.757	0.23

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Estimates obtained using the two-step system-GMM method, with regressors lagged one period and using a restricted instrument matrix (see section 4.3.1).

Finally, column (6) in each panel is the same as (5) but without the interaction term, thus similar to Perotti (1996) cross-sectional specification, and is included for comparison purposes. With a panel structure, when social mobility is not considered the results point to a one for one effect of market inequality on net inequality (no change in redistribution), which again underscores the relevance of taking into account the moderating effect of social mobility when analyzing the inequality-redistribution relation. Regarding the coefficients on the controls, the results are similar to those obtained in the OLS estimations. More democratic societies tend to redistribute more, as well as those with a larger share of older population, but these effects are insignificant in most of the specifications.

The bottom part of each panel in table 6 reports the tests for the validity conditions of the System-GMM estimation. The Sargan-Hansen test assesses the validity of the full instrument set under the null hypothesis of joint validity of all instruments, which is only rejected in column (2) in panel B. The last row in each panel tests the absence of second-order serial correlation, which is confirmed in all specifications except in column (4) of panel A. The existence of first-order serial correlation reported in panel B is not a concern, as it is expected by construction when a lagged dependent variable is included in the right hand side of the model. Overall, and especially in the preferred specification of column (5), the results satisfy the restrictions required by the System-GMM estimation.

4.3.3 Sensitivity and Robustness (Panel Estimation)

The sensitivity and robustness checks presented in this section assess the consistency of the baseline results in three main aspects: the methodological choices made within the system-GMM estimation (table 7), the use of other estimation methods (table 8), and the use of different variable definitions (table 9). The tables show the results of the different exercises using Net Gini as the dependent variable, and the same specification as in column (5) of table 6 which includes all the controls.[28] Table 7 presents estimation results varying different choices available when applying the system-GMM estimator, one at a time. Column (1) reports the baseline results for comparison, while columns (2)-(7) show the estimates using all available lags as instruments, not collapsing the instrument matrix, using the one-step version of the estimator, dropping time fixed effects, using contemporaneous regressors, and averaging variables for 10-year periods, respectively. The results are generally consistent across specifications. In particular, the coefficients on inequality and the interaction term are significant and have the expected signs in all columns. Their magnitudes are similar in all cases, predicting around a one for one effect of market inequality on net inequality when social mobility is the lowest, and between 40% and 50% lower when mobility is the highest. Only when using contemporaneous regressors the predicted compensating effect of social mobility is considerably lower, around 20%, which could be explained by the lag in the response of fiscal policy to changes in market inequality. It must be

[28]The same robustness exercises of tables (7) and (8) are reported in appendix B using absolute redistribution as a dependent variable, finding very similar results.

noted that the validity conditions for the system-GMM estimator are not satisfied in some specifications: the Hansen-Sargan test rejects the null of joint validity of the instrument set in columns (4) and (5), and using 10-year periods may present a second-order autocorrelation problem.

Besides the potential biases of other panel estimation methods explained in section 4.3.1, I present the results of estimating the model using pooled-OLS, fixed effects (only within and two-ways), first-differences and difference-GMM, for completeness and because they are fairly consistent with the baseline estimates of table 6, which is reassuring. Table 8 shows that the significance, magnitude and sign of the coefficients on inequality and its interaction with social mobility are in line across estimation methods and with those of the baseline results. The compensating effect of social mobility is even larger than in the baseline, reducing the increase in net inequality below 0.4 Gini-points after a 1 Gini-point increase in market inequality, for the highest level of social mobility. The only exception is column (5) that uses the difference-GMM estimator of Arellano and Bond (1991). While the estimated coefficients are of similar magnitude as in the other columns, the interaction term coefficient is far from significant, possibly explained by the fact that this method removes all between country variation, where most of the variation of the sample lies.

Table 7: Sensitivity (System-GMM)

	Dept. Variable: Net Gini						
	Baseline	All lags	No collapse	One-step	No time effects	Contemp.	10-year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$GINI^{mkt}$	1.307***	1.150***	0.817***	1.119***	1.062***	0.943***	1.311***
	(0.137)	(0.150)	(0.081)	(0.238)	(0.077)	(0.097)	(0.210)
$GINI^{mkt} * (1 - IGE)$	−0.674***	−0.611***	−0.263***	−0.416**	−0.551***	-0.178*	−0.726***
	(0.110)	(0.146)	(0.101)	(0.194)	(0.116)	0.101	(0.217)
Democracy	−0.013	−0.030	−0.097**	−0.067	−0.043	0.029	−0.014
	(0.024)	(0.033)	(0.044)	(0.057)	(0.036)	0.045	(0.056)
log(GDPpc)	1.269***	1.218*	1.028	1.102	0.179	-0.322	1.380**
	(0.463)	(0.633)	(0.694)	(1.064)	(0.525)	0.858	(0.641)
Population 65+	−0.236	−0.344*	−0.794***	−0.520**	−0.255*	-0.569***	−0.198
	(0.163)	(0.207)	(0.191)	(0.221)	(0.143)	0.161	(0.278)
N. Countries	72	72	72	72	72	72	72
N. Observations	398	398	398	398	398	459	177
Hansen p-val	0.598	0.515	1	0.003	0.036	0.610	0.219
M1 p-val	0.345	0.181	0	0.171	0.052	0.000	0.739
M2 p-val	0.178	0.231	0.958	0.32	0.218	0.300	0.064

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Column (1) reports the baseline results, while columns (2)-(7) introduce different variations (one at a time) of the system-GMM estimation.

Finally, table 9 provides the results of using different variable definitions. In particular, measuring social mobility with data on the intergenerational persistence in educational attainment (IGP) from the GDIM database and using the sample of IGE estimates gathered by Corak (2006); and using absolute and relative redistribution as a dependent variable. While the magnitudes and signs are consistent with the rest of the estimations presented so far, in some specifications the coefficients lose significance when using Corak's sample or IGP as a measure of social mobility. In the first case, it is important to notice the sharp drop in the number of countries and observations (Corak only provides comparable IGE estimates for 26 countries), which clearly affect the precision of the estimated coefficients. Anyhow, the p-values of the interaction coefficients of columns (5) and (8) are 0.162 and 0.112, very close to being significant. In columns (3) and (6), where IGP is used to measure social mobility, the p-values of the interaction coefficient are 0.236 and 0.119, which again are marginally significant. Overall, the use of different variable definitions does not invalidate the baseline results.

Table 8: Different Panel Estimation Methods

	Dept. Variable: Net Gini				
	POLS	FE (within)	FE (twoways)	First-Diff	Diff-GMM
	(1)	(2)	(3)	(4)	(5)
$GINI^{mkt} * (1 - IGE)$	1.034^{***}	1.058^{***}	1.108^{***}	1.015^{***}	1.247^{***}
	(0.061)	(0.078)	(0.075)	(0.101)	(0.413)
$(1 - IGE)$	21.558^{***}				
	(5.115)				
$GINI^{mkt} * (1 - IGE)$	-0.655^{***}	-0.687^{***}	-0.698^{***}	-0.814^{***}	-0.532
	(0.109)	(0.132)	(0.127)	(0.167)	(0.664)
Democracy	-0.084^{***}	-0.041^{**}	-0.019	-0.006	0.002
	(0.018)	(0.018)	(0.018)	(0.022)	(0.022)
log(GDPpc)	0.208	0.098	0.853^{***}	0.616^{**}	1.249^{***}
	(0.234)	(0.225)	(0.248)	(0.288)	(0.344)
Population 65+	-0.813^{***}	-0.036	0.074	0.016	0.036
	(0.058)	(0.056)	(0.057)	(0.094)	(0.110)
N. Countries	72	72	72	72	72
N. Observations	469	469	469	398	398
R^2	0.889	0.640	0.661	0.382	
Adjusted R^2	0.887	0.571	0.586	0.374	
F Statistic	614.217^{***}	139.458^{***}	149.436^{***}	48.481^{***}	
Hansen p-value					0.072
M1 p-value					0.322
M2 p-value					0.086

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Column (2) includes only country fixed effects, while column (3) also adds time fixed effects. The difference-GMM estimation of column (5) uses the same lag structure as the baseline system-GMM specification.

Table 9: Different Variable Definitions (System-GMM)

	Dependent Variable:								
	Net Gini			Absolute Redist.			Relative Redist.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$GINI^{mkt}$	1.307***	0.914***	1.110***	−0.181	−0.065	−0.308	−0.736**	−0.551	−1.009*
	(0.137)	(0.217)	(0.212)	(0.120)	(0.192)	(0.217)	(0.300)	(0.361)	(0.594)
$GINI^{mkt} * (1 - IGE)$	−0.674***			0.388**			0.816**		
	(0.110)			(0.195)			(0.406)		
$GINI^{mkt} * (1 - IGE_{Corak})$		−0.526**			0.515			0.975	
		(0.253)			(0.368)			(0.613)	
$GINI^{mkt} * (1 - IGP)$			−0.346			0.522			1.208*
			(0.292)			(0.336)			(0.713)
Democracy	−0.013	−0.180	−0.050	−0.014	0.025	−0.009	−0.001	0.096	0.036
	(0.024)	(0.135)	(0.041)	(0.019)	(0.090)	(0.030)	(0.031)	(0.250)	(0.062)
log(GDPpc)	1.269***	−0.946	−0.578	−0.431	−0.889	0.105	−0.870	2.068	−0.231
	(0.463)	(2.043)	(1.140)	(0.599)	(3.252)	(0.689)	(1.027)	(4.785)	(1.411)
Population 65+	−0.236	−0.130	−0.519*	0.496	0.631	0.538*	1.070*	0.694	1.295**
	(0.163)	(0.240)	(0.284)	(0.321)	(0.662)	(0.318)	(0.648)	(0.782)	(0.629)
N. Countries	72	26	66	72	26	66	72	26	66
N. Observations	398	185	380	398	185	380	398	185	380
Hansen p-val	0.598	0.189	0.002	0.106	0.111	0.006	0.218	0.286	0.006
M1 p-val	0.345	0.458	0.196	0.006	0.024	0.002	0.001	0.036	0.001
M2 p-val	0.178	0.115	0.48	0.757	0.794	0.634	0.935	0.742	0.712

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Column (2) includes only country fixed effects, while column (3) also adds time fixed effects. The difference-GMM estimation of column (5) uses the same lag structure as the baseline system-GMM specification.

5 Conclusions

I propose a mechanism in which inequality, social mobility and tax enforcement imperfections interact in the democratic choice of fiscal policy. When tax evasion is possible, voters need to take into account the implementability of tax policy. In particular, the decisive voter needs to make sure that the relatively rich individuals will participate in the tax and transfer system and will not decide to evade taxes. In this sense, tax evasion puts a limit to the amount of redistribution in the economy. Social mobility plays an important role in this setting, as it favors the tax enforcement process by reducing the incentives for evasion for the relatively rich individuals. High mobility societies can therefore implement higher levels of taxation and redistribution. Moreover, the positive relation between inequality and taxation derived by canonical politico-economic models does not always hold once tax evasion and social mobility are introduced. In a simple and stylized model I show how higher inequality leads to higher tax rates only in relatively mobile societies. When social mobility is low, higher inequality leads to a decrease in taxation. Furthermore, the result carries forward when introducing deviations from prefect democracy, as well as when we move from a two-type economy to a distribution of types. This clear-cut theoretical prediction is broadly supported by the empirical evidence provided by the paper, using both a cross-sectional approach and a panel structure. While the empirical analysis carried out in this paper can not be compared to studies that establish causality in a theoretically rigorous fashion, through randomized control trials or other methods, the results imply a significant contribution with respect to the type of studies still highly cited regarding the inequality-redistribution hypothesis and its applications. In particular, the literature on the effect of inequality on growth that generally discards the *political economy channel* (i.e. *endogenous fiscal policy channel)* based on the conclusions of Perotti (1996) of a lack of significant relation in the data between inequality and fiscal variables (e.g. Halter et al. (2014) p. 85, or Neves et al. (2016) p.16). By providing consistent evidence on the mediating role of social mobility, the results of the present paper call forth a revision of this mechanism, from a theoretical and empirical point of view. Finally, from a public policy perspective, the results of the paper provide two main takeaways. First, the importance of considering the practical implementability of fiscal policy when analyzing potential tax reforms. Second, that policies that increase the level of mobility in society can, as a by-product, help reduce the level of (net) inequality in the present as they enable the implementation of a more redistributive fiscal policy.

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Appendix A. Proofs of Propositions

Proof of Proposition 1

To show the result, it is necessary to prove first that at τ^*, every individual chooses to comply with the tax system, $\rho^i = 0, \forall i$. Let $\underline{\tau}$ be such that for any $\tau > \underline{\tau}$, the poor individuals prefer the rich ones to comply with taxes. Conversely, for any $\tau < \underline{\tau}$ they prefer the rich to evade. Similarly, let $\bar{\tau}$ be such that for any $\tau > \bar{\tau}$, the rich individuals prefer to evade taxes, while for any $\tau < \bar{\tau}$ they are better off taking part of the tax and transfer system. If $\underline{\tau} \leq \bar{\tau}$, then there is always a tax rate that induces the rich individuals to comply, and makes the poor individuals better off than when the rich evade. We can find $\underline{\tau}$ equalizing the utility of the poor individual when everyone complies to his utility when the rich individuals evade taxes:

$$U(y_L + \tau(\bar{y} - y_L)) = U\left(y_L + \frac{\delta\theta\eta y_H}{1-\delta}\right)$$

Therefore:

$$\underline{\tau} = \frac{y_H}{y_H - y_L}\frac{\theta\eta}{1-\delta}$$

Notice that $\underline{\tau}$ is independent of the utility function. We can find $\bar{\tau}$ in the same way, as the tax rate that satisfies $\bar{V}(\tau) = \bar{V}^e$. In this case, the solution will depend on the function U. It is easy to show that for linear utility, $\bar{\tau} = \frac{y_H}{y_H - y_L}\frac{\theta\eta}{1-\delta} = \underline{\tau}$. Notice that $\bar{V}(\tau)$ is not risky, while $\bar{V}^e$ involves a gamble given by the audit process. Thus an increase in the risk aversion of the individuals would make $\bar{\tau}$ increase. Therefore, for any concave function U, it is always the case that $\underline{\tau} \leq \bar{\tau}$, and the poor will choose a tax rate that implies generalized compliance.

Given that $\bar{V}(\tau)$ is strictly decreasing in τ, and $\underline{V}(\tau)$ strictly increasing in τ, the poor individuals will vote for the highest tax rate that satisfies that the rich participate in the tax and transfer system, that is τ^* such that $\bar{V}(\tau^*) = \bar{V}^e$ for an interior solution, or $\tau^* = 1$ otherwise. For the case of CRRA utility, in case of an interior solution, the equilibrium tax rate solves:

$$\frac{(y_H + \tau(\bar{y} - y_L))^{1-\sigma}}{1-\sigma} = \frac{\theta(1-\eta)^{1-\sigma}y_H^{1-\sigma}}{1-\sigma} + \frac{(1-\theta)y_H^{1-\sigma}}{1-\sigma}$$

With some algebra we can get $\tau^* = \frac{y_H(1-A)}{y_H - \bar{y}}$, where $A \in [0,1]$ is given in the proposition. In the case of a corner solution, the rich are better off complying than evading taxes for any $\tau \in [0,1]$, so the poor would choose an equilibrium tax of $\tau^* = 1$. ■

Proof of Proposition 2

The result can be proved taking the derivative of τ^* with respect to θ and η:

$$\frac{\partial\tau^*}{\partial\theta} = -\frac{y_H}{y_H - \bar{y}}\frac{1}{1-\sigma}\left[\theta((1-\eta)^{1-\sigma} - 1) + 1\right]^{\frac{\sigma}{1-\sigma}}\left((1-\eta)^{1-\sigma} - 1\right) > 0$$

$$\frac{\partial\tau^*}{\partial\eta} = \frac{y_H}{y_H - \bar{y}}\frac{1}{1-\sigma}\left[\theta((1-\eta)^{1-\sigma} - 1) + 1\right]^{\frac{\sigma}{1-\sigma}}\theta(1-\sigma)(1-\eta)^{-\sigma} > 0$$

■

Proof of Proposition 3

A mean preserving spread increases y_H while keeping $\bar{y}$ constant, so the sign of its effect on τ^* is determined by:

$$\frac{\partial \tau^*}{\partial y_H} = -\frac{(1-A)\bar{y}}{(y_H - \bar{y})^2} < 0$$

■

Proof of Lemma 1

Denote by c_H the consumption of an individual with high realized endowment, and c_L the consumption of an individual with low realized endowment, after taxes and transfers have taken place. Then we have:

$$\begin{aligned}
\frac{\partial \underline{V}(\tau)}{\partial \tau} &= \gamma U'(c_L)(\bar{y} - y_L) + (1-\gamma)U'(c_H)(\bar{y} - y_H) \\
&= \gamma U'(c_L)(\bar{y} - y_L) - (1-\gamma)U'(c_H)\frac{1-\delta}{\delta}(\bar{y} - y_L) \\
&= \gamma U'(c_L)(\bar{y} - y_L) - (1-\pi)U'(c_H)(\bar{y} - y_L) \\
&= (\bar{y} - y_L)\left(\gamma U'(c_L) - (1-\pi)U'(c_H)\right) > 0
\end{aligned}$$

Where the last inequality follows from the fact that $U(\cdot)$ is an increasing and concave function, $\gamma > \frac{1}{2}$ and $\pi > \frac{1}{2}$.
For an individual from a rich family, we have:

$$\begin{aligned}
\frac{\partial \bar{V}(\tau)}{\partial \tau} &= \pi U'(c_H)(\bar{y} - y_H) + (1-\pi)U'(c_L)(\bar{y} - y_L) \\
&= (\bar{y} - y_L)\left[(1-\pi)U'(c_L) - \pi U'(c_H)\frac{1-\delta}{\delta}\right]
\end{aligned}$$

The sign of the derivative depends on the second term in the above expression, which is greater than zero when:

$$\frac{U'(c_L)}{U'(c_H)} > \frac{\pi}{(1-\pi)}\frac{1-\delta}{\delta}$$

The left hand side is a monotonically decreasing function that reaches 1 when $\tau = 1$. The right hand side is a constant greater than 1. Thus there exist some $\tau_{max} < 1$ such that $\frac{\partial \bar{V}(\tau)}{\partial \tau} < 0$ for any $\tau > \tau_{max}$. ■

Proof of Proposition 4

Assuming an initially interior solution, the participation constraint for a rich family individual would be binding, and thus holding with equality. Given that $U(\cdot)$ is an increasing function, $\bar{V}^e$ decreases as a result of the increase in θ or η, so that the participation constraint is relaxed. Therefore it must be that the equilibrium tax adjusts so that $\bar{V}(\tau)$ also falls. Given that we know that, at τ^*, $\frac{\partial \bar{V}(\tau)}{\partial \tau} < 0$, it must be that τ^* increases.

For the last part of the proposition, regarding income mobility, notice that an increase in π increases both the right and left hand sides of the participation constraint for the individual born to a rich family. Given that, in equilibrium, $\bar{V}(\tau)$ is decreasing in τ, in order to prove the result it suffices to show that $\frac{\partial \bar{V}(\tau)}{\partial \pi} < \frac{\partial \bar{V}^e}{\partial \pi}$, that is:

$$U(c_H) - U(c_L) < \theta(U((1-\eta)y_H) - U((1-\eta)y_L)) + (1-\theta)(U(y_H) - U(y_L))$$

$$U(c_H) - U(y_H) + U(y_L) - U(c_L) < \theta(U((1-\eta)y_H) - U(y_H) + U(y_L) - U((1-\eta)y_L))$$

For any $\tau > 0$, $c_H < y_H$ and $y_L < c_L$, so the left hand side of the expression above is always negative. For the case of logarithmic utility ($\sigma = 1$), we can easily verify that the right hand side is non-negative:

$$\theta(\log((1-\eta)y_H) - \log(y_H) + \log(y_L) - \log((1-\eta)y_L)) = \theta \log \frac{(1-\eta)y_H y_L}{y_H(1-\eta)y_L} = 0$$

For the case of $\sigma > 1$, we can again show that the right hand side is non-negative:

$$\begin{aligned}
&\frac{\theta}{1-\sigma}\left((1-\eta)y_H)^{1-\sigma} - y_H^{1-\sigma} + y_L^{1-\sigma} - ((1-\eta)y_L)^{1-\sigma}\right) = \\
&\frac{\theta}{1-\sigma}\left(y_H^{1-\sigma}\left((1-\eta)^{1-\sigma} - 1\right) - y_L^{1-\sigma}\left((1-\eta)^{1-\sigma} - 1\right)\right) = \\
&\frac{\theta\left((1-\eta)^{1-\sigma} - 1\right)}{1-\sigma}(y_H^{1-\sigma} - y_L^{1-\sigma}) > 0
\end{aligned}$$

Where the last inequality follows from the fact that $\sigma > 1$. ■

Proof of Proposition 5

Using the fact that $\bar{y} = \delta y_H + (1-\delta)y_L$, we can write the participation constraint for the individual born to a rich family as:

$$\begin{aligned}
\pi U\left(y_H - \tau(y_H - \bar{y})\right) + (1-\pi)U\left(\frac{\bar{y} - \delta y_H}{1-\delta} + \tau\frac{\delta}{1-\delta}(y_H - \bar{y})\right) \geq \\
\pi\left(\theta U\left((1-\eta)y_H\right) + (1-\theta)U\left(y_H\right)\right)\\
+ (1-\pi)\left[\theta U\left((1-\eta)\frac{\bar{y} - \delta y_H}{1-\delta}\right) + (1-\theta)U\left(\frac{\bar{y} - \delta y_H}{1-\delta})\right)\right]
\end{aligned}$$

To determine the effect of a mean preserving spread on the equilibrium tax rate, we need to check whether the participation constraint is relaxed and thus τ^* would increase, or vice versa. Notice that a mean preserving spread would increase y_H and leave $\bar{y}$ unchanged, so we can see if the participation constraint is relaxed or not taking the derivative with respect to y_H:

$$\begin{aligned}
\frac{\partial \bar{V}(\tau) - \bar{V}^e}{\partial y_H} =& \pi U'(c_H)(1-\tau) - (1-\pi)U'(c_L)(1-\tau)\frac{\delta}{1-\delta}\\
&- \theta\pi U'((1-\eta)y_H)(1-\eta) + \theta(1-\pi)U'((1-\eta)y_L)(1-\eta)\frac{\delta}{1-\delta}\\
&- (1-\theta)\pi U'(y_H) + (1-\theta)(1-\pi)U'(y_L)\frac{\delta}{1-\delta}
\end{aligned}$$

The participation constraint will be relaxed whenever $\frac{\partial \bar{V}(\tau)-\bar{V}^e}{\partial y_H} > 0$, which is the case if:

$$\pi < \frac{1}{1+\frac{1-\delta}{\delta}\frac{\theta(1-\eta)U'((1-\eta)y_H)+(1-\theta)U'(y_H)-(1-\tau)U'(c_H)}{\theta(1-\eta)U'((1-\eta)y_L)+(1-\theta)U'(y_L)-(1-\tau)U'(c_L)}} = \pi^*$$

Thus for any $\pi < \pi^*$, an increase in inequality relaxes the participation constraint, so the equilibrium tax rate must increase to make it hold with equality again. Conversely, for any $\pi > \pi^*$, higher inequality leads to a decrease in the equilibrium tax rate. When $\pi = \pi^*$, the increase in inequality does not change the equilibrium tax rate. ■

Proof of Proposition 6

The effect of an increase in inequality on the equilibrium tax rate is given by the derivative of τ^* with respect to y_H:

$$\frac{\partial \tau^*}{\partial y_H} = \frac{(y_H - \bar{y}) - \left(y_H - \frac{\bar{y}}{\delta+(1-\delta)B}\right)}{(y_H - \bar{y})^2} = \frac{\bar{y}\left(\frac{1}{\delta+(1-\delta)B} - 1\right)}{(y_H - \bar{y})^2}$$

When $\chi > 1/2$ the expression is always positive. When $\chi < 1/2$ we have a corner solution where the tax rate equals 1 for any level of inequality, so a mean preserving spread does not change the equilibrium tax rate. ■

Proof of Proposition 7

Taking the derivative of the equilibrium tax rate with respect to B yields:

$$\frac{\partial \tau^*}{\partial B} = \frac{\frac{\bar{y}}{y_H-\bar{y}}(1-\delta)}{(\delta+(1-\delta)B)^2} > 0$$

Given that $\frac{\partial B}{\partial \chi} < 0$, we have that $\frac{\partial \tau^*}{\partial \chi} < 0$. ■

Proof of Proposition 8

First, focus on any level of political power of the rich (χ) such that the participation constraint is binding given the initial level of inequality. We know from proposition 6 that the tax rate that solves the unconstrained maximization problem is non-decreasing in inequality. Thus, even if the equilibrium tax rate was unchanged, the participation constraint would also bind for the new level of inequality. As a result, we can conclude that for any level of political power of the rich for which the participation constraint was binding initially, it will also bind after the increase in inequality, and therefore the change in the equilibrium tax rate is governed by the derivative of τ^* with respect to y_H when the participation constraint holds with equality:

$$\frac{\partial \tau^*}{\partial y_H} = -\frac{(1-B)\bar{y}}{(y_H - \bar{y})^2} < 0$$

We can define $\bar{\chi}$ as the level of political power of the rich that solves:

$$\bar{V}^e(y'_H, y'_L) = \frac{y_H - \frac{\bar{y}}{\delta+(1-\delta)B}}{y_H - \bar{y}}$$

The left hand side is the expected utility of evasion for the rich after the mean preserving spread. Notice that if the participation constraint binds at the new inequality level, $\bar{V}^e(y'_H, y'_L)$ also implicitly determines the equilibrium tax rate. The right hand side is the solution for the tax rate when the participation constraint does not bind under the initial level of inequality. That is, $\bar{\chi}$ is the highest level of political power of the rich for which the new equilibrium tax rate when the participation constraint binds is lower than the initial equilibrium tax rate (with binding or non-binding constraint). As a result, we know that for any $\chi \leq \bar{\chi}$ the equilibrium tax rate decreases with the mean preserving spread. ■

Proof of Proposition 9

To prove the result, we need to show that the equilibrium tax is increasing in social mobility (decreasing in π) when the non-evasion constraint for the rich binds and when it does not bind. The former case is equivalent to that in proposition 4, and the proof carries forward without change. In the case in which the non-evasion constraint does not bind, the first order condition for the problem yields:

$$\frac{c_L}{c_H} = \left(\frac{\chi(1-\gamma) + (1-\chi)\gamma}{\chi\pi + (1-\chi)(1-\pi)}\right)^{1/\sigma} = D$$

It is easy to show that for $\chi = 1/2$, $\frac{c_L}{c_H} = 1$ so that $\tau^* = 1$. Also, that for $\chi = 1$, $\frac{c_L}{c_H} < 1$ so that $\tau^* < 1$. That is, τ^* is decreasing in χ when the participation constraint does not bind. Furthermore, $\frac{\partial \tau^*}{\partial \pi} < 0$ also in this case. That is, whether the participation constraint binds or not, the equilibrium tax rate is always increasing in social mobility. ■

Proof of Proposition 10

When the participation constraint for the rich binds, the proof is the same as in proposition 5. When the participation constraint does not bind, it can be shown in a similar way as in proposition 6 that a mean preserving spread increases the equilibrium tax rate for $\chi > 1/2$. Remember that for $\chi \leq 1/2$ the equilibrium tax rate is always 1 when the PC does not bind. Thus for any $\pi \leq \pi^*$, an increase in inequality will always increase the equilibrium tax rate, as the first part of the proposition states.

If we define $\bar{\chi}$ as the level of political power of the rich that solves $\bar{V}^e(y'_H, y'_L) = \frac{y_H - \frac{\bar{y}}{\delta+(1-\delta)D}}{y_h - \bar{y}}$, and follow the same logic as in proposition 8, we can prove the second part of the proposition. That is, when $\pi > \pi^*$ the equilibrium tax decreases with inequality for $\chi \leq \bar{\chi}$ and increases with inequality when $\chi > \bar{\chi}$. ■

Appendix B (Online Publication)

B.1 Additional Tables and Figures (Cross-Sectional Estimation)

Table B.1: Dept. Variable: Relative Redistribution (OLS Estimation)

	Dept. Variable: Relative Redistribution					
	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	-0.264	-0.655	-1.325^{***}	-1.573^{***}	-0.412	-0.006
	(0.234)	(0.509)	(0.496)	(0.332)	(0.312)	(0.385)
$(1-IGE)$		-57.104	-94.037^{**}	-133.950^{***}	-48.876^{*}	-15.437
		(44.790)	(46.938)	(33.498)	(26.955)	(29.117)
$GINI^{mkt} * (1-IGE)$		2.170^{**}	2.749^{***}	3.314^{***}	1.327^{**}	0.510
		(0.956)	(0.991)	(0.708)	(0.575)	(0.612)
Democracy			1.035^{***}	0.367	-0.038	0.274^{*}
			(0.280)	(0.258)	(0.177)	(0.147)
log(GDPpc)				7.219^{***}	0.179	0.335
				(1.154)	(1.206)	(1.137)
Population 65+					2.539^{***}	1.481^{***}
					(0.310)	(0.370)
Regional Dummies	No	No	No	No	No	Yes
Observations	69	69	69	69	69	69
Adjusted R^2	-0.000	0.421	0.531	0.691	0.820	0.857

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Regional dummies according to the 7-region World Bank classification.

Table B.2: Different Measures of Social Mobility (OLS Estimation)

	Dept. Variable: Net Gini					
	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	1.482^{***}	0.823^{***}	0.645	1.165^{***}	0.741^{***}	0.133
	(0.366)	(0.291)	(0.424)	(0.249)	(0.238)	(0.321)
$(1 - IGP)$	57.341^{**}	12.653	4.658			
	(25.930)	(21.059)	(27.753)			
$(1 - IGE_{Corak})$				40.905	19.479	−25.078
				(29.416)	(25.099)	(29.503)
$GINI^{mkt} * (1 - IGP)$	-1.381^{**}	−0.398	−0.143			
	(0.570)	(0.458)	(0.601)			
$GINI^{mkt} * (1 - IGE_{Corak})$				-1.523^{**}	-1.073^{*}	0.063
				(0.647)	(0.580)	(0.690)
Democracy	−0.098	−0.004	-0.214^{*}	−0.244	0.136	0.158
	(0.110)	(0.098)	(0.116)	(0.203)	(0.167)	(0.248)
log(GDPpc)	-3.391^{***}	0.192	0.156	-2.510^{**}	0.350	−1.611
	(0.631)	(0.717)	(1.034)	(1.004)	(0.894)	(1.653)
Population 65+		-1.098^{***}	-0.410^{**}		-0.970^{***}	−0.410
		(0.146)	(0.196)		(0.182)	(0.252)
Regional Dummies	No	No	Yes	No	No	Yes
Observations	66	66	66	26	26	26
Adjusted R^2	0.709	0.801	0.846	0.860	0.916	0.962

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Regional dummies according to the 7-region World Bank classification.

Table B.3: Removing Outliers (OLS Estimation)

	Removing 3 highest and lowest observation on:								
	Net Inequality			Market Inequality			Social Mobility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$GINI^{mkt}$	1.151***	0.786***	0.348*	1.055***	0.743***	0.298	1.269***	0.950***	0.659**
	(0.178)	(0.191)	(0.194)	(0.176)	(0.191)	(0.185)	(0.209)	(0.209)	(0.299)
$(1 - IGE)$	50.234***	21.669	−11.334	38.241***	18.794	−18.232	49.326***	28.505	−0.319
	(13.456)	(15.965)	(13.143)	(14.827)	(16.635)	(13.266)	(17.822)	(18.137)	(20.556)
$GINI^{mkt} * (1 - IGE)$	−1.329***	−0.664*	0.097	−1.072***	−0.607*	0.241	−1.305***	−0.810**	−0.214
	(0.275)	(0.342)	(0.285)	(0.299)	(0.350)	(0.278)	(0.384)	(0.393)	(0.462)
Democracy	−0.168	−0.019	−0.220**	−0.196	−0.016	−0.242**	−0.171	−0.033	−0.272***
	(0.135)	(0.133)	(0.105)	(0.138)	(0.135)	(0.105)	(0.126)	(0.113)	(0.093)
log(GDPpc)	−2.147***	−0.125	−0.011	−2.129***	−0.025	0.065	−2.302***	−0.161	0.579
	(0.604)	(0.719)	(0.753)	(0.602)	(0.732)	(0.740)	(0.618)	(0.741)	(0.776)
Population 65+		−0.767***	−0.262		−0.811***	−0.266		−0.782***	−0.264
		(0.179)	(0.207)		(0.191)	(0.215)		(0.163)	(0.201)
Regional Dummies	No	No	Yes	No	No	Yes	No	No	Yes
Observations	63	63	63	63	63	63	63	63	63
Adjusted R^2	0.743	0.794	0.849	0.754	0.800	0.858	0.777	0.819	0.861

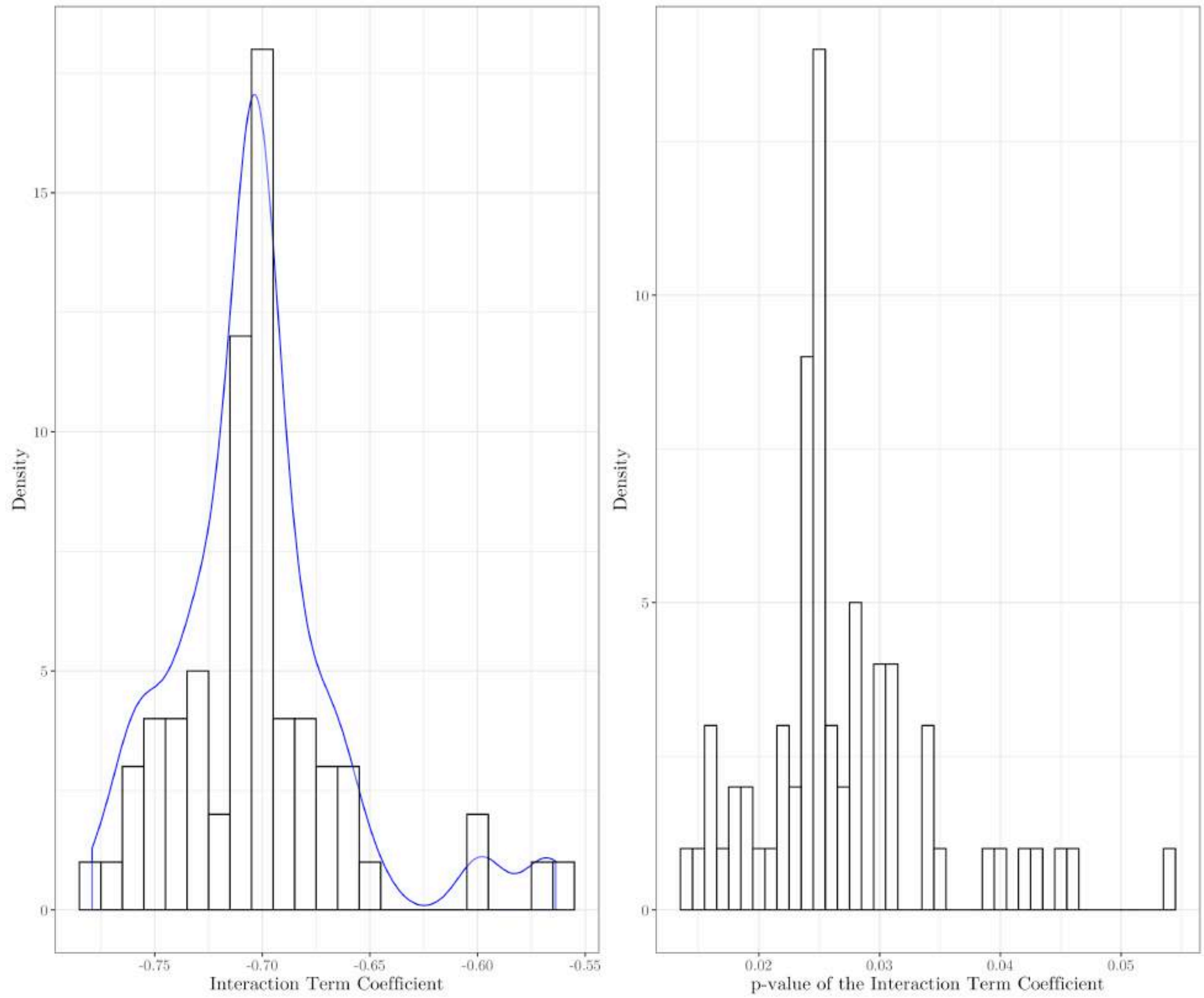
Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Regional dummies according to the 7-region World Bank classification.

Table B.4: CHANGE OF CUT-OFF DATES TO CALCULATE AVERAGES (OLS ESTIMATION)

	All vars. 1980-2015			Averaging Period: Ind. Vars. 1980-1985 Dept. Var. 1985-2015			Ind. Vars. 1980-1990 Dept. Var. 1990-2015		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$GINI^{mkt}$	1.603***	1.183***	0.996***	1.309***	0.899***	0.714**	1.286***	0.913***	0.697***
	(0.154)	(0.136)	(0.185)	(0.218)	(0.220)	(0.288)	(0.158)	(0.167)	(0.228)
$(1 - IGE)$	71.417***	39.168***	21.497	50.979***	21.720	1.735	51.481***	23.884*	7.227
	(12.745)	(11.639)	(13.520)	(15.996)	(17.585)	(18.084)	(12.099)	(13.748)	(14.061)
$GINI^{mkt} * (1 - IGE)$	−1.739***	−1.000***	−0.578**	−1.316***	−0.634*	−0.254	−1.321***	−0.672**	−0.285
	(0.263)	(0.249)	(0.282)	(0.297)	(0.348)	(0.393)	(0.248)	(0.289)	(0.321)
Democracy	−0.201	−0.009	−0.223***	−0.391*	−0.139	−0.347*	−0.162	0.016	−0.214*
	(0.132)	(0.100)	(0.085)	(0.210)	(0.201)	(0.179)	(0.130)	(0.122)	(0.110)
log(GDPpc)	−2.356***	0.278	0.026	−1.973**	0.117	−0.016	−2.793***	−0.423	−0.271
	(0.588)	(0.539)	(0.640)	(0.870)	(0.771)	(1.062)	(0.680)	(0.874)	(1.261)
Population 65+		−0.946***	−0.389***65+		−0.858***	−0.209		−0.867***	−0.341
		(0.133)	(0.145)		(0.188)	(0.253)		(0.187)	(0.242)
Regional Dummies	No	No	Yes	No	No	Yes	No	No	Yes
Observations	72	72	72	48	48	48	63	63	63
Adjusted R^2	0.808	0.878	0.918	0.855	0.896	0.918	0.827	0.869	0.890

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels. Regional dummies according to the 7-region World Bank classification.

Figure B.1: Taking One Observation Out at a Time (OLS Estimation)



Note: Coefficient and p-value of the interaction term between market inequality and social mobility (1-IGE), including as controls the measure of democratic institutions, log(GDPpc) and the share of population above 65 years old. Net inequality as dependent variable. Each estimation is carried out taking one observation (country) out at a time, so with a total of 68 countries.

B.2 Additional Tables and Figures (Panel Estimation)

Table B.5: Different Estimation Methods (AR as Dependent Variable)

	Dept. Variable: Absolute Redistribution				
	POLS	FE (within)	FE (twoways)	First-Diff	Diff-GMM
	(1)	(2)	(3)	(4)	(5)
$GINI^{mkt}$	-0.083	-0.091	-0.155^{**}	-0.116^{*}	-0.324
	(0.060)	(0.062)	(0.061)	(0.062)	(0.286)
$(1 - IGE)$	-22.921^{***}				
	(5.057)				
$GINI^{mkt} * (1 - IGE)$	0.670^{***}	0.435^{***}	0.516^{***}	0.325^{***}	1.163^{**}
	(0.108)	(0.104)	(0.103)	(0.103)	(0.526)
Democracy	0.057^{**}	-0.026^{*}	-0.045^{***}	-0.014	-0.003
	(0.028)	(0.014)	(0.015)	(0.011)	(0.011)
log(GDPpc)	-0.141	0.427^{**}	-0.043	-0.014	0.046
	(0.231)	(0.178)	(0.201)	(0.177)	(0.377)
Population 65+	0.901^{***}	0.227^{***}	0.135^{***}	0.107^{*}	-0.027
	(0.057)	(0.044)	(0.047)	(0.058)	(0.148)
N. Countries	72	72	72	72	72
Observations	469	469	469	398	398
R^2	0.820	0.393	0.207	0.061	
Adjusted R^2	0.817	0.278	0.034	0.050	
F Statistic	350.190^{***}	50.964^{***}	20.086^{***}	5.137^{***}	
Hansen p-val					0.244
M1 p-val					0.005
M2 p-val					0.343

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels.

Table B.6: Sensitivity (System-GMM, AR as Dependent Variable)

	Dept. Variable: Absolute Redistribution					
	lag 2:4	All lags	No collapse	One-step	No time effects	Contemp.
	(1)	(2)	(3)	(4)	(5)	(6)
$GINI^{mkt}$	-0.181	-0.232^{***}	0.129^{*}	-0.290	-0.050	0.0570
	(0.120)	(0.086)	(0.069)	(0.277)	(0.060)	(0.097)
$GINI^{mkt} * (1 - IGE)$	0.388^{**}	0.433^{***}	0.183^{**}	0.458^{**}	0.382^{**}	0.178^{*}
	(0.195)	(0.156)	(0.078)	(0.221)	(0.160)	(0.100899)
Democracy	-0.014	-0.019	0.041	-0.045	-0.015	-0.029
	(0.019)	(0.020)	(0.053)	(0.055)	(0.014)	(0.045)
log(GDPpc)	-0.431	-0.649	-0.906^{*}	-1.479	0.115	0.322
	(0.599)	(0.715)	(0.544)	(1.319)	(0.286)	(0.858)
Population 65+	0.496	0.552^{**}	1.065^{***}	0.702^{**}	0.392^{**}	0.569^{**}
	(0.321)	(0.261)	(0.222)	(0.278)	(0.193)	(0.161)
N. Countries	72	72	72	72	72	72
N. Observations	398	398	398	398	398	459
Hansen p-val	0.106	0.473	1	0	0.044	0.610
M1 p-val	0.006	0.002	0	0.006	0	0
M2 p-val	0.757	0.623	0.209	0.630	0.621	0.300

Note: Robust standard errors in parenthesis. *, **, *** denote significance at 0.1, 0.05 and 0.01 levels.