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Inequality and Growth: How Social Mobility Reshapes The Main Theoretical Channels

Ignacio P. Campomanes

Navarra Center for International Development - University of Navarra

Navarra Center for International Development
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Inequality and Growth: How Social Mobility Reshapes The Main Theoretical Channels*

Ignacio P. Campomanes †

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Abstract

This paper analyzes how the different mechanisms proposed to explain the inequality-growth relation are affected by the introduction of social mobility in a politico-economic environment with imperfect tax enforcement. I show that the direct negative effect of inequality on growth predicted by models of incomplete markets is especially pronounced in societies with low social mobility, while it is lessened in highly mobile economies. This is due the different effects of the increase in inequality on redistribution in each case. Conversely, in models where inequality favors economic growth because of investment indivisibilities or heterogeneity in marginal propensities to save among the population, the opposite result applies. Inequality is especially beneficial for economic growth when social mobility is low, as the compensating effect of redistribution is reduced. Finally, exogenous taxation costs modulate the previous findings depending on whether redistribution helps or retards economic growth. Conditional correlations of market inequality and economic growth across countries point to an important modulating effect of social mobility.

JEL Classification: E24, E62, O43, P16

Keywords: Inequality, Social Mobility, Economic Growth, Taxation

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†NCID-University of Navarra. Postal address: ICS-Universidad de Navarra, Edificio de Bibliotecas - Entrada Este, 2 Planta, Pamplona, Spain 31009. E-mail: campomanes@unav.es

1 Introduction

How inequality in the distribution of resources affects subsequent economic development is a question that has received great attention by economists at least since the early work of Kaldor (1957), which predicts a growth-enhancing effect of inequality. If economic growth is based on the accumulation of capital, the story goes, and assuming that richer individuals have a higher propensity to save, a more unequal society would have a higher aggregate saving rate and therefore grow faster. Conversely, and closer to the current generalized view, distributional inequity can be a source of inefficiency that deters growth in the presence of imperfections in the credit or insurance markets. This perspective was initially proposed by the seminal papers of Banerjee and Newman (1991) and Galor and Zeira (1993)[1], and their insights are at the heart of ensuing research (Ferreira (1995), Aghion and Bolton (1997), Benabou (2000) among others). These direct mechanisms rely on features of the economic environment, and their proponents usually abstracted from fiscal policy in their models.[2] On the contrary, the channel suggested by Persson and Tabellini (1994) and Alesina and Rodrik (1994) works its way from inequality to economic growth through the political system, due to the endogenous determination of fiscal policy. In their framework, inequality does not produce any direct effect on growth, but does influence the preferences for redistribution and the associated distortionary costs. As a result, higher inequality fosters redistributive pressures (by a median voter argument), increasing distortions and slowing economic growth. Direct and indirect mechanisms are not mutually exclusive, and they can be considered jointly by clearly differentiating between market and net inequality. The former is the relevant measure of inequality taken into account by individuals when deciding over fiscal policy, creating tax distortions but also affecting the level of net inequality, which determines to what extent direct effects (positive or negative) further affect the level of economic growth.

The first leg of the mechanism, how market inequality affects fiscal policy, is therefore crucial. The classic approach is given by the political economy argument of Meltzer and Richard (1981), in

[1] The model in Galor and Zeira (1993), with imperfect credit markets and a minimum investment in human capital, has many times been taken as the paradigm of a setting in which inequality deters economic growth. Nevertheless, the negative result depends on the initial distribution of wealth. If an important share of the population receives a bequest sufficiently low, then an increase in inequality might be growth-enhancing if it allows at least some individuals to reach the minimum level of investment. In such an economy, the reduced form relation between inequality and growth would be equivalent to that of Kaldor (1957).

[2] The negative effect of inequality on growth predicted by the incomplete market models has motivated the call forth a redistributive fiscal policy that could serve as a substitute for the missing market, and therefore favor growth, but this was not generally included explicitly in the models (see for example Aghion et al. (1999)).

which higher inequality makes the median voter poorer with respect to the country average and thus fosters redistributive pressures. Anyhow, the empirical evidence of the so called *Meltzer-Richard effect* is far from clear (see Perotti (1996), Benabou (1996), and more recently Pecoraro (2014) or Choi (2019)). In order to deal with this puzzle, Campomanes (2020) introduces social mobility and tax evasion in the classic framework, and shows that the positive relation between inequality and redistributive taxation only holds in relatively mobile societies, while is reversed when social mobility is low. The intuition for the result is simple. On the one hand, social mobility (i.e. the potential rise or fall along the income ladder) creates an insurance motive for fiscal policy that complements the usual redistributive component. On the other, the capacity of individuals to try to evade their tax obligations creates an outside option, especially beneficial for those who expect to be net contributors to the tax and transfer system. In such a setting, low social mobility implies that the insurance benefits of the fiscal system are small, and the desires for higher redistribution of the decisive voter are not implementable due to the higher incentives for evasion of those at the top of the income distribution.

In this paper I set up an endogenous growth model in the spirit of Aghion et al. (1999), that captures in reduced form the mechanisms through which inequality might affect economic growth, and I embed the political environment of Campomanes (2020). The resulting framework is stylized and simple, permits to isolate direct and indirect mechanisms, and allows to mimic the classic set-ups described above. I then use the model for two purposes. First, to analyze how the predictions of the classic theories are reshaped by the endogenous determination of fiscal policy when social mobility and imperfect tax enforcement are taken into account. Think about environments of incomplete markets in which inequality creates some form of investment inefficiency, *à la* Galor and Zeira (1993). In these models, inequality reduces growth and therefore a redistributive fiscal policy that helps equalize resources among the population is growth enhancing. Anyhow, if taxes and redistribution are the outcome of a political process as the one sketched above, the relation between inequality and growth is non-linear. Inequality is always detrimental to growth, but especially so in relatively less mobile economies. The opposite can be shown in environments where inequality favors economic growth, through the higher marginal propensity to save of relatively rich individuals, or the need to provide adequate incentives to effort and entrepreneurship. In such settings, the beneficial effects of inequality on growth are especially relevant when social mobility is low, while are significantly reduced when mobility is high. The intuition behind both results is similar. High social mobility favors the tax enforcement process by reducing the incentives of

the relatively rich individuals to evade taxes. As a consequence, in highly mobile societies an increase in inequality produces higher taxation and redistribution. Fiscal policy thus ameliorates the growth-reducing effects of a rise in inequality in the first case, or its growth-promoting effects in the latter. In the so-called political economy channel proposed by papers like Persson and Tabellini (1994), in which inequality only affects growth through the indirect channel of tax distortions, a rise in inequality is detrimental to growth only in highly mobile societies, as only in this case higher inequality increases redistribution and distortions. Conversely, when mobility is low, increasing inequality favors economic growth as it leads to lower taxation.

Second, I analyze the case in which direct effects coming from the economic environment and indirect effects coming from tax distortions are operative simultaneously. The theoretical result is weaker in this case, because both effects influence growth in opposite directions for some levels of social mobility, and therefore the overall sign of the relation between inequality and growth is not always unambiguous. In particular, if the direct effect is negative (positive), higher inequality is unequivocally growth-reducing (-enhancing) only if social mobility is relatively high (low), as tax distortions are also higher (lower) in this case.

The results derived reflect an important degree of uncertainty on the overall effect of inequality on growth at a theoretical level, and thus call forth a full fleshed quantitative model that can asses the relative importance of the different channels, or a rigorous empirical study that can disentangle the distinct forces at play. The former is beyond the scope of this paper, which aims to constitute only a first approximation to the joint analysis of economic and political effects of inequality on growth, and is left for future research. The latter has been a matter of study of a large body of literature,[3] but as of today no econometric technique seems free of weaknesses and potential problems, so no clear consensus based on a causally identified effect has been reached yet. Nevertheless, an analysis of the association of inequality, social mobility and economic growth, even at a level of correlations, can be useful for two purposes. First, as a simple first test of the importance of taking into account social mobility as a modulating factor in the inequality-growth relation; second, as a guide for future quantitative research. Thus, section 5 presents results on the correlation between inequality and economic growth conditioning on the level of social mobility, based on data for inequality from the Standardized World Income Inequality Database (Solt (2019)), and from the Global Database on Intergenerational Mobility recently released by the World Bank (GDIM (2018)) to proxy for the level

[3] See section 5 for a brief review of the empirical literature, and a discussion of the different econometric techniques and potential issues raised for each of them.

of social mobility across countries, for the period 1980-2018. Simple and conditional correlations, as well as OLS and panel regressions introducing an interaction term between (market) inequality and mobility, suggest that the level of mobility influences the intensity and even the direction of the relation between inequality and economic growth. Nevertheless, the results depend on what type of variation is captured by the different techniques used (between or within country).[4] Conditional correlations and OLS regressions, that primarily capture between country variation in the long run, yield an overall negative relation between inequality and growth, which is driven by observations with relatively low levels of social mobility.[5] Instead, panel regressions that remove between country variation and thus capture the association of inequality and economic growth within a given country, generally show a positive relation between both variables, more pronounced the lower the level of mobility.

The rest of the paper is structured as follows. Section 2 presents a simple politico-economic framework that can account for a variety of the mechanisms explained. Section 3 defines and characterizes the politico-economic equilibrium of the model. Section 4 proves the main results about the relation between inequality and economic growth for different parameter values that correspond to the different channels proposed in the literature. Section 5 presents the results of the empirical analysis. Finally, section 6 concludes.

2 Model

In this section, I set up a simple model which can account, in reduced form, for a variety of the transmission mechanisms detailed above. I use the endogenous economic growth setting of Aghion et al. (1999), including a source of exogenous tax distortions in the spirit of Persson and Tabellini (1994). Fiscal policy is the outcome of a political process equivalent to the one in Campomanes (2020), where tax rates depend on inequality, social mobility and the tax enforcement technology. This framework can account for direct (positive or negative) effects of inequality on growth arising

[4] This result is in line with previous empirical studies, but the results of this paper are not directly comparable to most of the previous literature that used a measure of post-taxes and transfers inequality, while the political mechanism stressed in this paper demands a measure of pre-taxes and transfers inequality.

[5] Aiyar and Ebeke (2020) provide a similar specification to the one presented here and use the system-GMM estimator, reporting as well a negative relation between inequality and growth, stronger the lower the level of social mobility. The system-GMM estimator captures both between and within variation, but the serious instability concerns of this technique raised by Kraay (2015) and Bazzi and Clemens (2013) among others requires to take the causal interpretation of their results with caution.

from the economic environment, as well as indirect effects of inequality brought about by the determination of fiscal policy in a democratic political process.

2.1 Households

There is a continuum of overlapping generation families indexed by $i \in [0,1]$. Each family is composed of one individual who lives for one period. Families can be of two types: high (H) or low (L). A measure δ of them will be high type and a measure $(1-\delta)$ low, where $\delta < 1/2$. The type of the family determines the probability distribution over initial endowments $y^i \in \{y_H, y_L\}$. In particular, an individual born to a rich family has a probability π of having a high endowment, and $(1-\pi)$ of having a low endowment. An individual born to a poor family has a probability γ of having a low endowment and $(1-\gamma)$ of having a high endowment. In order to keep the fraction of high type families and endowments constant and equal to δ, it must be that $\gamma = 1 - \frac{(1-\pi)\delta}{(1-\delta)}$. This assumption also ensures that average income in the economy is given by $\bar{y} = \delta y_H + (1-\delta) y_L$, which will be normalized to 1. I will also assume that $\pi \geq \frac{1}{2}$, so an individual born to a rich family is more likely to turn out rich tan poor; and that $\delta y_H < 1/2$, so that the sum of income received by those individuals who get a high endowment is less than half of aggregate income. Without loss of generality, I assume that the type of each family does not vary over time.[6] Individuals only value consumption during the period in which they live, not the future consumption of their descendants, according to the utility function $U(c_t^i)$. For simplicity, I will consider the case of logarithmic utility, $U(c_t^i) = \log(c_t^i)$, but the results below carry forward to constant relative risk aversion utility functions as long as the degree of risk aversion is sufficiently high.[7] Individual consumption depends on the political and production processes explained next.

2.2 Political Environment

There is a government that collects proportional taxes on initial endowments, and lump-sum redistributes total tax revenue. The tax rate is determined in a democratic political process that takes place once family types are known, but before actual endowments are realized, where each individual has one vote. Each individual can decide whether to comply with his tax obligations

[6] The way family types are assigned is irrelevant. Assuming that family types are randomly assigned at the beginning of the period, that each individual inherits the initial family type of his father, or his end of period type, is equivalent as long as the fraction of high type family individuals is δ in every period.

[7] For the standard case of $U(c_t^i) = (c_t^i)^{1-\sigma}/(1-\sigma)$, a sufficient condition is $\sigma \geq 1$.

or to try to evade taxes. This decision is denoted by $\rho_t^i \in \{0,1\}$ where 1 denotes compliance, and takes place after the vote on tax rates, but before the realization of actual endowments. The government runs a tax enforcement process, auditing a fraction $\theta \in [0,1]$ of the population. If an individual evades taxes and is audited, the government imposes a proportional penalty on his endowment $\eta \in [0,1]$, and excludes him from transfers. If an individual evades taxes and is not audited, he keeps his whole endowment, but does not receive transfers. The auditing process is costless for the government. Notice that total tax revenue is the sum of taxes voluntarily paid by those who comply and the penalties collected from audited tax evaders, net of taxation costs, and is only redistributed to those who complied in the first place. I introduce exogenous taxation costs, to capture the idea that taxation involves some distortions. These costs have a quadratic form $\phi\bar{y}\frac{\tau_t^2}{2}$, where $\phi \geq 0$ captures the magnitude of these costs. Denoting by P_t the share of individuals who voluntary complied in period t, and T_t is the lump-sum transfer received by each of them, the government budget constraint is given by:

$$\int \left[\tau_t y_t^i \rho_t^i + \theta\eta y_t^i (1-\rho_t^i)\right] di - \phi\bar{y}\frac{\tau_t^2}{2} = T_t \cdot P_t \tag{1}$$

2.3 Production

Each individual born in period t uses his after-tax endowment $(\hat{y}_t^i)$ to invest in the production of the consumption good according to the following individual production function:

$$F(\hat{y}_t^i) = A_t \left(\hat{y}_t^i\right)^\alpha \tag{2}$$

The value of α determines the marginal returns with respect to individual investments. Total output is the sum of all individual outputs. When $\alpha = 1$, there are constant returns to scale with respect to individual investments, and (after-tax) inequality does not affect aggregate output. If $0 < \alpha < 1$, higher dispersion of individual investments reduces total output, while when $\alpha > 1$ higher inequality increases total production. The level of technological knowledge in period t is given by A_t, and is common to all individuals. The economy features learning by doing and knowledge spillovers, so technology in period t depends on the amount of aggregate production in the previous periods:

$$A_t = \int A_{t-1} \left(\hat{y}_{t-1}^i\right)^\alpha di \tag{3}$$

Denote aggregate output in period t as Y_t, then economic growth between periods $t-1$ and t is given by:

$$g_t = \ln \frac{Y_t}{Y_{t-1}} = \ln \frac{\int A_t \left(\hat{y}_t^i\right)^\alpha di}{A_t} = \ln \int \left(\hat{y}_t^i\right)^\alpha di \tag{4}$$

To understand how this framework captures the mechanism proposed by papers that stress the incomplete markets channel, forget for a moment about the political determination of fiscal policy and the exogenous tax distortions ($\phi = 0$). In a situation in which $\alpha \in (0,1)$ inequality has a direct negative effect on growth. If initial endowments could be traded without frictions, all individuals would invest the same amount in equilibrium and economic growth would be maximized. If capital markets are imperfect, initial endowment disparities cannot be completely eliminated and therefore output and growth will be reduced. Assume the extreme case of no capital markets, so each individual is constrained by his initial endowment. As Aghion et al. (1999) and others propose, a redistributive fiscal policy that taxes those with high endowments and subsidizes those with low endowments is growth enhancing. Furthermore, the highest rate of economic growth is attained with full redistribution, when all endowments are equalized. In this environment, a tax rate $\tau = 1$ implies that every individual has a post-tax endowment of $\bar{y}$ and output growth is given by $\alpha \ln \bar{y}$.[8] Anyhow, as I show in this paper, when taxes are the outcome of a political process, full redistribution is not in general an equilibrium. Furthermore, if taxation involves some costs, then the potential efficiency benefits of redistribution trade off against its distortive costs.

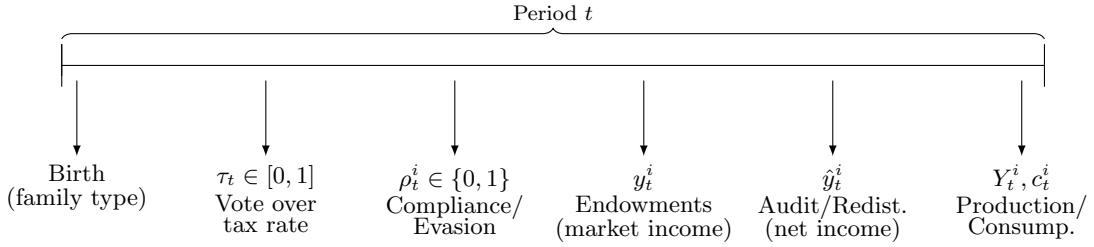
2.4 Timing

The timing within each period is depicted in Figure 1. At the beginning of the period one individual is born to each family. Each individual family type is public information so individuals know not only their own type, but also the distribution of family types in society. The first decision taken by each individual is the vote on the tax rate. After knowing the level of taxation that won the democratic vote, each individual makes his compliance-evasion decision. Then endowments are realized, according to the probabilities given to each family type. The audit and redistribution processes take place and individuals receive their net income. Finally, individuals invest their income net of taxes and transfers (or penalties in case of audited evaders), and produce and consume their

[8] The opposite situation would arise in a world in which higher initial disparities favor growth ($\alpha > 1$), so a regressive redistributive policy that accumulates all initial income in the hands of just one individual maximizes aggregate output and growth.

individual outputs.

Figure 1. Timing of Events



The crucial assumption about this timing is that the voting over tax rates and the compliance-evasion decision take place when individuals only know their family type, but not their actual endowment. They have therefore imperfect information about how fiscal policy will affect them. This way of introducing uncertainty about the future simplifies the analysis, but is clearly not very realistic. In reality, individuals get to update their decisions regarding tax rates and evasion several times throughout their lifetime. A more realistic approach would involve individuals living for two (or more) periods, realizing their type at the beginning of life, and making decisions over fiscal policy and evasion in each of them. Individual endowment shocks in each period would then generate uncertainty about the future (mobility). As long as, within each period, shocks are realized after the voting and evasion decisions, the results would be equivalent. Thus, the important aspect of the setting is the timing of events within the period, and thus reducing individuals' life to one period simplifies the exposition. Pre-dating individual decisions with respect to the actual realization of endowments can be rationalized thinking about two real-life phenomena. On the one hand, the legislative process in modern democracies is time consuming and, in particular, fiscal reforms are sporadic. This implies an important degree of stickiness of fiscal policy, which varies relatively less than individual incomes. On the other, top income tax evasion requires individuals to plan ahead and make some costly investments (hire lawyers and accountants, open bank accounts in tax heavens, etc.), so transitioning from evasion to compliance is not fast and easy.

Finally, notice as well that I assume no capital markets, an extreme form of market incompleteness that prevents individuals from trading their endowments to those with higher marginal productivities. Thus, after-tax endowments determine the production capacity of each individual, and

his level of consumption. This is the assumption made in the classic references of the incomplete market theories (e.g. Galor and Zeira (1993) and Aghion et al. (1999)), and followed here to ease the exposition. Anyhow, the results below would carry forward assuming a weaker form of credit market frictions as long as at least some individuals' borrowing constraint binds.

3 Politico-Economic Equilibrium

In the stylized framework of this paper, the relevant decisions of households are the vote over tax rates and the compliance-evasion choice. These two decisions determine after-tax endowments, which mechanically translate into individual investments, output and consumption. Aggregate output and therefore the evolution of technology and economic growth are as well just a function of these individual decisions. The definition of equilibrium imposes conditions on these two choices:

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

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

In order to characterize the equilibrium, first notice that in a two-type environment where individuals born to poor families are a majority, the equilibrium tax rate will be the most beneficial tax for them. Given the assumptions made on (π, δ, γ), individuals born to poor families are always benefited by the fiscal system, as they expect a positive net transfer and taxation reduces their income risk. For this reason, they always decide to comply with their tax obligations ($\rho_t^i = 1\ \forall t$ for all individuals born to low type families). For individuals born to high type families, the fiscal benefits in terms of insurance trade off against the cost in terms of redistribution to the poor. The compliance-evasion decision for these individuals depends on the tax rate decided in the majority vote, and the rest of exogenous parameters of the model (y_H, y_L, θ, η). It can be shown that, for sufficiently high tax rates, any further increase in taxation is always harmful for rich family individuals because the redistributive costs are larger than the insurance benefits. Individuals from poor families want to set the highest tax rate possible (as long as tax distortions are not too high), but they understand that the possibility of tax evasion limits the effectiveness of taxation in extracting resources from individuals born to rich families. That is, they look for the tax rate that maximizes their utility subject to the non-evasion constraint of the high family type individuals. Therefore in

equilibrium no individual evades ($\rho_t^i = 1\ \forall t, i$), and the transfer made to each individual is given by $T_t = \tau_t \bar{y} - \phi \bar{y} \frac{\tau_t^2}{2}$.[9] The no evasion result is a direct consequence of the two-type structure imposed. A more general distribution of family types generates some evasion in equilibrium, but does not qualitatively change the relation between inequality, social mobility and fiscal policy, as is shown in Campomanes (2020). Thus, in order to facilitate the exposition, I will restrict the analysis to only two family types. Formally, and dropping time subscripts for notational simplicity, the median voter solves the following problem:

$$\max_{\tau} \gamma \log \left[(1-\tau) y_L + \tau \bar{y} - \phi \bar{y} \frac{\tau^2}{2} \right] + (1-\gamma) \log \left[(1-\tau) y_H + \tau \bar{y} - \phi \bar{y} \frac{\tau^2}{2} \right] \tag{5}$$

s.t.

$$\pi \log \left((1-\tau) y_H + \tau \bar{y} - \phi \bar{y} \frac{\tau^2}{2} \right) + (1-\pi) \log \left((1-\tau) y_L + \tau \bar{y} - \phi \bar{y} \frac{\tau^2}{2} \right) \geq$$
$$\pi \left[\theta \log((1-\eta) y_H) + (1-\theta) \log y_H \right] + (1-\pi) \left[\theta \log \left((1-\eta) y_L \right) + (1-\theta) \log \left(y_L \right) \right] \tag{6}$$

The constraint might not be binding if audit and penalty rates are sufficiently high, so the utility of evasion for the high type family individuals is lower than under compliance for any tax rate. In such a case, given the assumptions made on the parameters that govern the stochastic process for endowments (π, γ), it can be shown that the optimal choice of the tax rate for the median voter is increasing in the level of inequality.[10] Even under maximal mobility ($1 - \pi = 1/2$), the classic *Meltzer-Richard effect* holds, and redistributive taxation and inequality are always positively related (Meltzer and Richard (1981)).[11] I will focus instead in areas of the parameter space in which the compliance-evasion constraint for the high type individuals binds at the most preferred tax rate of the median voter, so that he needs to make tax concessions in order to avoid generalized evasion. In this case, the equilibrium tax rate can be found by solving equation (6) with equality, and the

[9] It is easy to show that it is never optimal for the median voter to try to force high type family individuals into evasion in order to exclude them from transfers. There is always a lower tax rate that makes the net transfer equal and reduces distortionary costs.

[10] Throughout the paper, I will think of an increase in inequality as a mean preserving spread of initial endowments. That is, (y'_H, y'_L) is a mean preserving spread of (y_H, y_L) if $y'_H > y_H$, $y'_L < y_L$ and $\bar{y}' = \bar{y}$.

[11] As a measure of social mobility, I will use the probability that an individual born to a high type family receives a low initial endowment $(1-\pi)$, that is, a measure of downward mobility in the model. However, given the assumptions on (π, γ), using $(1-\gamma)$, the probability that a low family type individual receives a high endowment (upward mobility), would be equivalent.

following result emerges:[12]

Lemma 1. *There exists a cut-off level of social immobility,* $\pi^* \in [\frac{1}{2}, 1)$*, such that:*

(i) For $\pi = \pi^*$*, the equilibrium tax is independent of the level of inequality.*

(ii) For $\pi < \pi^*$*, the equilibrium tax is increasing in the level of inequality.*

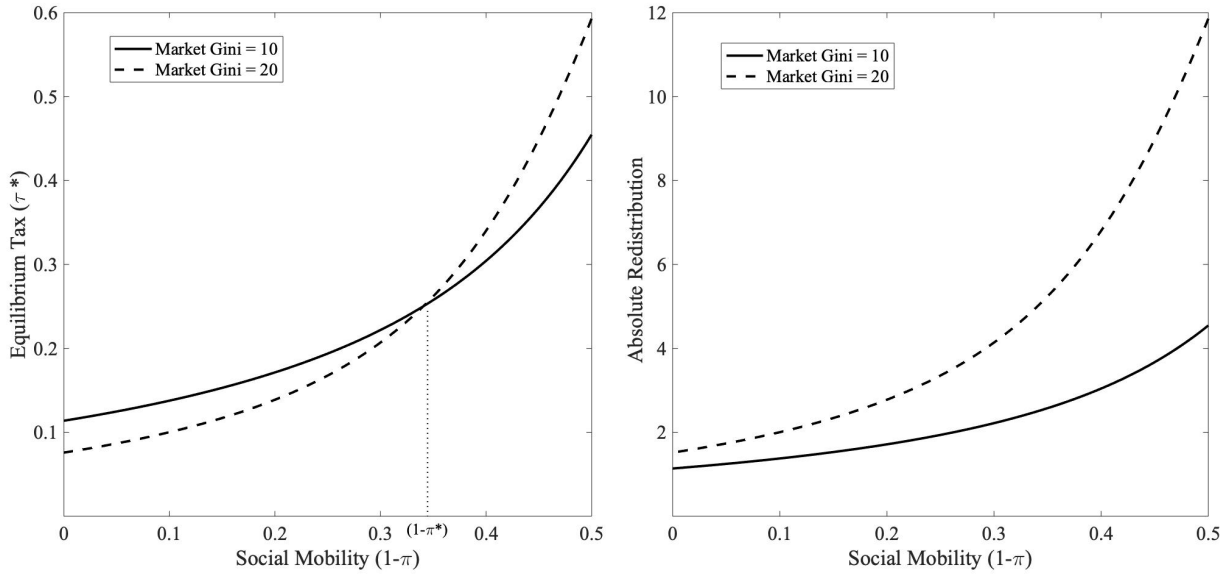
(iii) For $\pi > \pi^*$*, the equilibrium tax is decreasing in the level of inequality.*

Lemma 1 shows that a change in the level of inequality has different effects on the equilibrium tax depending on the degree of social mobility. In particular, there is a cut-off level of social mobility $(1 - \pi^*)$ such that, in high mobility economies ($\pi < \pi^*$) the equilibrium tax rate is increasing in inequality, while taxes are decreasing in inequality if mobility is low ($\pi > \pi^*$). Intuitively, taxes and transfers serve two purposes, redistribution and insurance, and the degree of social mobility plays a crucial role in determining the relative importance of each of them. When mobility is relatively high, the risk sharing benefits of fiscal policy more than offset its redistributive costs for the high type individuals, favoring the tax enforcement process and allowing for an increase in taxation when inequality raises. On the contrary, when mobility is relatively low, the increase in the redistributive burden of fiscal policy produced by the raise in inequality is big enough to make high type individuals prefer tax evasion unless tax rates are lowered. Low type family individuals (and among them the median voter) are thus forced to decrease tax rates to keep them in the tax and transfer system.

Figure 2 (left) graphically illustrates the result in lemma 1. The solid line depicts the equilibrium tax rate for different levels of social mobility, keeping market inequality constant. An increase in the market Gini coefficient produces opposite effects on each side of the cut-off level of mobility $(1 - \pi^*)$. Above such a level, the equilibrium tax increases, while it decreases for economies below the threshold. The graph on the right hand side shows how the change in pre-tax and transfers inequality and the subsequent variation in the equilibrium tax translates into the level of redistribution. In particular, absolute redistribution, defined as the absolute difference between before- and after- taxes and transfers Gini coefficients. This measure captures the reduction in inequality directly attributable to the fiscal system. The example shows that for high levels of social mobility (close to $1 - \pi = 0.5$), an increase in market inequality of 10 Gini points produces a rise in absolute redistribution of almost 8 Gini points, so that net inequality increases by less than

[12] All the proofs can be found in the appendix.

Figure 2. Inequality and Fiscal Policy



Note: Figures generated for $\sigma = 1.5$, $\theta = 0.1$, $\eta = 0.3$, $\delta = 0.2$, $\phi = 0$.

3 points. That is, more than 70% of the initial increase in inequality is offset by the movement towards a more redistributive fiscal system. Instead, for economies with low levels of social mobility ($(1-\pi)$ close to 0), only around 5% of the change in market inequality is compensated by higher absolute redistribution. Section 6 provides empirical support for the prediction of lemma 1, at a correlations level, further analyzed in Campomanes (2020).

4 Inequality and Growth: Comparative Statics

4.1 Reshape of the Classic Channels

Once the political equilibrium is characterized, and we know how the level of market inequality affects the determination of fiscal policy and thus net inequality, we can analyze its effects on total output and economic growth. Two parameters capture this relationship: the marginal returns to individual investments (α), and the exogenous taxation costs (ϕ). On the one hand, α determines the direct effect of (net) inequality on growth arising from the specific economic environment. When $\alpha \in (0, 1)$, higher net inequality implies lower aggregate production and therefore lower

technology and economic growth. This case would be a reduced form equivalent to the credit market imperfections mechanism explained above, proposed by papers like Galor and Zeira (1993) or Banerjee and Newman (1991). If $\alpha = 1$, inequality does not cause a direct effect on growth, neither positive nor negative. Finally, if $\alpha > 1$, higher inequality would produce a higher rate of economic growth, resembling mechanisms like the saving channel proposed by Kaldor (1957). On the other hand, ϕ captures the distortions created by taxation. When $\phi > 0$, taxation creates costs that reduce economic growth and, to the extent that market inequality affects the determination of tax rates, creates an indirect channel through which inequality affects total production and growth. These costs are equivalent to the negative labor supply effects of taxation in models with elastic labor, or the investment desincentives in dynamic models (Persson and Tabellini (1994), Alesina and Rodrik (1994), Perotti (1993)).

In the simple two type version of the model, we can rewrite the expression for the level of output growth in the economy (equation 4 above) in terms of y_H and τ^* as:

$$g = \ln\left[\delta\left((1-\tau^*)y_H + \tau^*\bar{y} - \phi\bar{y}\frac{\tau^{*2}}{2}\right)^{\alpha} + (1-\delta)\left((1-\tau^*)\frac{\bar{y}-\delta y_H}{1-\delta} + \tau^*\bar{y} - \phi\bar{y}\frac{\tau^{*2}}{2}\right)^{\alpha}\right] \tag{7}$$

Differentiating the term inside the bracket (equal to e^g) with respect to y_H, we can sign the effect of a mean preserving spread on economic growth, given that the logarithmic function is a monotone transformation. Such a derivative yields:

$$\frac{\partial e^g}{\partial y^H} = \underbrace{\delta\alpha\left[(\hat{y}_H)^{\alpha-1} - (\hat{y}_L)^{\alpha-1}\right]\cdot\left[(1-\tau^*) + \frac{\partial\tau^*}{\partial y_H}(\bar{y} - y_H - \phi\bar{y}\tau^*)\right]}_{\text{Direct effect}} \underbrace{-\alpha\phi\bar{y}\tau^*\,(\hat{y}_L)^{\alpha-1}\cdot\frac{\partial\tau^*}{\partial y_H}}_{\text{Indirect effect}} \tag{8}$$

Equation (8) clearly differentiates the direct and indirect effects of inequality on growth described in the previous paragraph. The second bracket in the first term of the equation (direct effect) is always positive, and decreasing in the level of social mobility. The first bracket in the direct effect term depends on the value of α: it is positive when $\alpha > 1$, negative when $\alpha \in (0,1)$, and zero when $\alpha = 1$. Finally, the sign of the last term in the equation (indirect effect) depends on the level of social mobility, as it determines the sign of $\frac{\partial\tau^*}{\partial y_H}$ according to lemma 1. The next proposition establishes how the introduction of social mobility and tax evasion reshapes the classic channels in the inequality and growth literature.

Proposition 1. *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 $\bar{y}' = \bar{y}$.*

(i) For $\phi = 0$ and $\alpha \in (0,1)$, economic growth is decreasing in inequality.

(ii) For $\phi = 0$ and $\alpha > 1$, economic growth is increasing in inequality.

(iii) For $\phi > 0$ and $\alpha = 1$, economic growth is decreasing in inequality when social mobility is relatively high ($\pi < \pi^*$) and increasing in inequality when social mobility is relatively low ($\pi > \pi^*$).

Furthermore, the magnitude of the effect (positive or negative) is decreasing in social mobility $(1 - \pi)$.

Part (i) in proposition 1 imposes conditions on α and ϕ so that the model captures in reduced form the environment of the credit market imperfections channel. The introduction of social mobility and tax evasion does not change the overall direction of the effect of inequality on growth, which is always negative, but does modulate its magnitude. In particular, the negative effect of inequality on growth is magnified when social mobility is low, and quieten when social mobility is relatively high. This is due to the relation between market inequality and redistribution established in lemma 1. For a given level of mobility below the threshold $(1 - \pi^*)$, higher market inequality is associated with lower taxes and redistribution, which further increases the level of net inequality in society, inflicting a larger drag on economic growth. When social mobility is relatively high (above the cut-off level), higher market inequality is partly compensated with an increase in redistributive taxation, so the effect on post-tax inequality is smaller, and thus also on growth. The result is graphically showed in the upper left panel of figure 3. The solid line depicts economic growth for an initial level of market inequality, for different values of social mobility $(1 - \pi)$. If market inequality increases, but we do not allow the tax rate to adjust, we would move to the dotted line: economic growth falls for any level of mobility. Once we allow the tax rate to adjust to its new equilibrium level (dashed line), we see that the fall in growth is reduced for relatively high levels of social mobility (due to the increase in redistributive taxation), but is amplified when mobility is low (as the fall in redistribution further increases net inequality). Part (ii) in the proposition establishes the effect of inequality on growth in the opposite environment, where the level of inequality in society is growth enhancing, as in models that stress the higher marginal propensity to save and invest of individuals in the higher end of the income/wealth distribution, or the potential positive incentive effects of inequality that induce a higher level of effort or risk taking among the population. The analysis is equivalent (but symmetric) to the one in the previous case. Now higher market inequality is always

positive for economic growth, and especially so when social mobility is relatively low, as the growth promoting effect of the initial rise in market inequality is additionally stimulated by the fall in the equilibrium level of redistribution. The upper right panel of figure 3 depicts this case. Finally, part (iii) in the proposition resembles the so called *political economy channel*, where the effect of inequality on economic growth works its way indirectly through the distortions created by fiscal policy. The introduction of social mobility and tax evasion does change the sign of the relation of inequality and growth predicted by the standard models when social mobility is relatively low. In this case, higher inequality produces and fall in taxation and thus also in the distortionary costs associated with fiscal policy. When social mobility is relatively high, and the positive correlation of market inequality and taxation holds, the negative relation between inequality and growth emerges. The bottom panel of figure 3 shows that the cut-off level of mobility identified in lemma 1 also determines the level of mobility below which the inequality-growth relation turns negative.

The graphs in figure 3 also show how economic growth is affected by the degree of social mobility, for a given level of pre-tax inequality. Higher social mobility increases the incentives to comply for individuals born to high type families, benefiting the tax enforcement process and increasing equilibrium taxes and redistribution. Looking at the solid lines of each panel, we see that for a given level of market inequality, economic growth is increasing in mobility when $\alpha \in (0,1)$, and decreasing when $\alpha > 1$. In a similar way, higher audit and penalty rates have the same effects as higher social mobility, as these exogenous changes difficult tax evasion producing an increase in taxation and redistribution. Corollary 1 formally proves these results.

Corollary 1. *For a given level of market inequality:*

(i) If $\alpha \in (0,1)$ and $\phi = 0$, economic growth is increasing in social mobility $(1-\pi)$, the audit rate (θ) and the penalty rate (η).

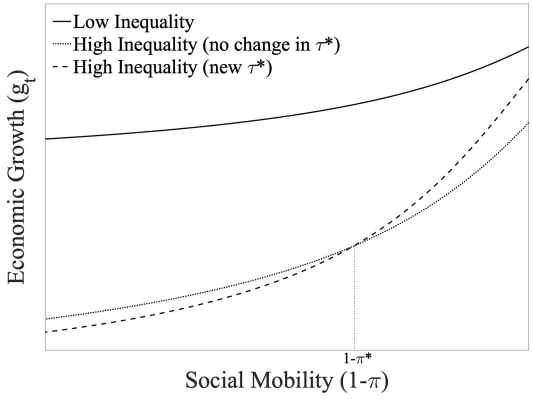
(ii) If $\alpha > 1$ and $\phi = 0$, economic growth is decreasing in social mobility $(1-\pi)$, the audit rate (θ) and the penalty rate (η).

4.2 Simultaneous Direct and Indirect Effects

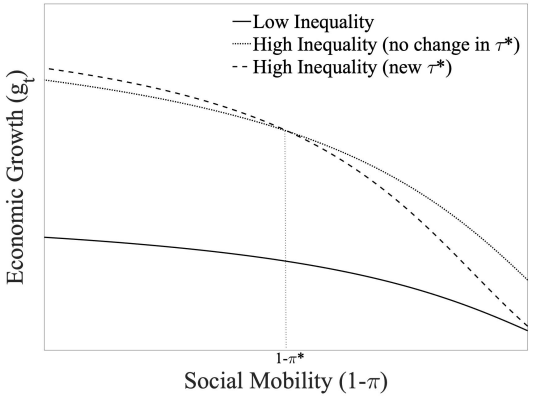
Proposition 1 shows how the classic theories on the relation between inequality and growth are modified by the introduction of social mobility and tax evasion. Anyhow, as explained in the introduction, these theories focused either only on the direct effect, or the indirect effect, but did not consider both simultaneously. When both channels are operative (i.e. $\alpha \neq 1, \phi > 0$), the

Figure 3. Inequality and Economic Growth

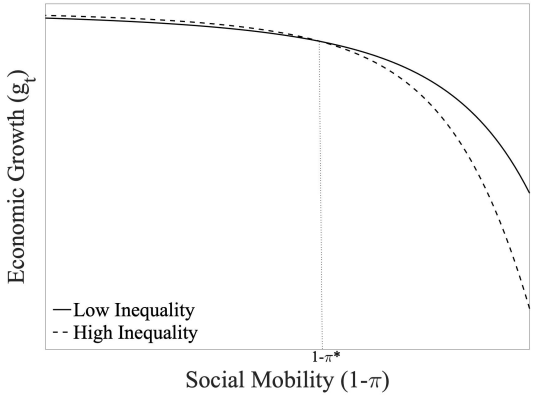
(a) $\alpha \in (0,1), \phi = 0$



(b) $\alpha > 1, \phi = 0$



(c) $\alpha = 1, \phi > 0$



Note: Figures generated for $U(c) = c^{1-\sigma}/\sigma$, $\sigma = 1.5$, $\theta = 0.1$, $\eta = 0.3$, $\delta = 0.2$, $y_H = 5$, $y'_H = 6$, $\bar{y} = 3$, $\alpha = 0.8$ in panel (a), $\alpha = 1.2$ in panel (b), $\phi = 1$ in panel (c).

following result can be proved:

Proposition 2. *Let $\phi > 0$. Then:*

(i) For $\alpha \in (0,1)$, economic growth is decreasing in inequality when $\pi \leq \pi^*$, and can be increasing or decreasing in inequality when $\pi > \pi^*$.

(ii) For $\alpha > 1$, economic growth is increasing in inequality when $\pi \geq \pi^*$, and can be increasing or decreasing in inequality when $\pi < \pi^*$.

The result in proposition 2 is weaker than the previous one, because when both direct and indirect effects are present, these might operate in opposite directions. Therefore, the sign of the overall effect of inequality on economic growth is not always unambiguous, but depends on the specific values of the exogenous parameters. In part (i) the direct effect is always negative, but the indirect effect produced by the distortionary costs of taxation depends on whether redistribution increases or falls. As a result, only when social mobility is relatively high the total effect of inequality on growth is unequivocally negative. When mobility is relatively low, the negative direct effect trades-off with the positive indirect effect due to lower tax distortions, and the total effect is not clear. Part (ii) states that only when social mobility is relatively low both effects are for sure positive, and therefore inequality favors growth when $\alpha > 1$, but when social mobility is high the indirect effect turns negative and the aggregate direction is ambiguous.

4.3 Discussion

The theoretical results of this section are obviously stylized and dependent on parameter values that impose a clear-cut overall politico-economic environment. In real world economies, the different mechanisms are likely to be present simultaneously. Not only direct and indirect effects are potentially operative, which already introduces a degree of uncertainty on the overall effect of inequality on growth as shown in proposition 2, but also the different and opposing mechanisms that in the model are subsumed in the direct effect (α) can play a role concurrently in real economies. For example, inequality can be an important factor influencing the proportion of financially constrained individuals in the overall economy, reducing their investment in productive physical or human capital, but can as well favor higher investment from individuals at the higher end of the distribution in the presence of indivisibilities. Consequently, the direction of the total effect of inequality on economic growth, as well as the relative importance of the different channels, is a question that requires a full fleshed quantitative model. This task is beyond the scope of the present paper, which

aims to represent only a first attention call regarding the importance of theoretically analyzing the inequality-growth relation in conjunction with social mobility and fiscal policy, and is left for future research.

5 Empirics of Inequality and Growth

The early empirical studies on the effect of inequality and growth in the decade of the 1990's were based on reduced form cross-country OLS regressions of a measure of initial inequality (usually Gini indices or the income share of the middle quintiles) on average economic growth for the subsequent 20-30 years.[13] Typical controls included the initial level of real GDP per capita, average human capital, or regional dummies. Prominent examples of these kind of studies are given by Persson and Tabellini (1994), Perotti (1993), Perotti (1996), Deininger and Squire (1998) or Clarke (1995), which all found a significant negative relation between inequality and the growth rate of output per capita. Nevertheless, Persson and Tabellini (1994) and Perotti (1996) report that the effect of inequality becomes insignificant when regional dummies are included in the model. A set of papers posed different caveats on this result, using panel data techniques (mainly fixed effects and difference-GMM specifications) to include within country variation effects. Forbes (2000) found a positive effect of inequality on short term growth. Barro (2000) claimed that the sign of the effect of inequality depends on the country's development level, being positive for developed countries and negative for developing ones, and reporting an insignificant relation when all countries were pooled together. Castell-Climent (2010) and Knowles (2005) found similar results, with the latter reporting an insignificant relation between inequality and growth for mid-rich countries. As Forbes (2000) points, the interpretation of results from panel data analyses differs from that of cross-country studies. The former measure how changes in inequality relate to changes in economic growth for a given country (within variation), while the latter suggest that countries with lower levels of inequality have higher levels of income in steady state (between variation). Another important difference between both types of specifications relates to the length of the time periods analyzed (medium vs. long term effects). The system-GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) which uses both equations, in differences and

[13] See Benabou (1996) for an early revision of the literature, and Cingano (2014), Ostry et al. (2014) or Castells-Quintana and Royuela (2017) for more recent ones. Neves et al. (2016) and Cingano (2014) offer a detailed discussion on the econometric methods and data constraints of the literature.

in levels, was used widely in the following years as a way to jointly capture between and within variations of the data. Several papers used this estimator and tried to further qualify the relation between inequality and economic growth. Voitchovsky (2005) found that inequality affects growth differently depending of the source of inequality, having a positive effect when it is the rich who pull away and a negative effect when the poor fall behind. Cingano (2014) provided supporting evidence for the same result for OECD countries. Banerjee and Duflo (2003) found that changes in inequality, in any direction, are associated with lower growth. Halter et al. (2014) claimed that higher inequality helps economic performance in the short term but reduces growth in the long run. Ostry et al. (2014) documents that inequality not only produces lower average long run growth, but also reduces the duration of growth spells. Anyhow, Bazzi and Clemens (2013) and Kraay (2015) among others have recently showed the serious instability of the system-GMM estimator, and highlighted the generalized weak instrumentation problem of these studies.

This succinct review of the empirical literature points to a clear conclusion: as of today, no econometric technique is capable of identifying the causal effect of inequality on growth, let alone of assessing the importance of the different channels proposed. Consequently, empirical evidence can at best provide results on the correlation of both variables. Nevertheless, correlations results can be useful in order to guide future quantitative research, and thus in what follows I present an initial approximation that mimics some of the classic studies mentioned above, introducing an interaction term between inequality and social mobility. The main goal is to discern whether the co-movement of inequality and growth is affected by the introduction of social mobility, and can help guiding future theoretical and quantitative research by pointing to a specific economic environment. In terms of the model and propositions 1 and 2, to see whether the correlations shown by the data can suggest an area of the parameter space (α, ϕ) closer to reality.

5.1 Data

The model presented in the previous sections requires a set of data that differs from those used in previous empirical studies in two main ways. First, almost all prior research has used data on post-taxes and transfers (i.e. net) income inequality. The predictions of propositions 1 and 2 relate pre-taxes and transfers inequality (market inequality) and economic growth. While the correlation between both measures is usually high, it is crucial in this case to use the the latter one. This constraint calls forth the use of the Standardized World Income Inequality Database (SWIID v.

9.0) gathered by Solt (2019), which provides comparable Gini coefficients for a large number of countries and years, clearly differentiating between pre (market) and post (net) taxes and transfers inequality. 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. The second difference is the pivotal role of the level of social mobility in the theoretical results, which requires to find comparable data on mobility levels across countries. There exists several ways to measure social mobility.[14] The closer proxy to π in the model would be the intergenerational elasticity of income (IGE), defined as the coefficient resulting from regressing childs earnings on parents earnings. Despite an important body of literature that has provided estimates of IGE at a national level, these country-specific estimates are not directly comparable as they differ in methodology, underlying data, period of analysis, etc.[15] The intergenerational persistence of educational attainment (IGP), defined similarly to the IGE, as the coefficient resulting from regressing childs years of education on that of his/her parents, represents a second best proxy for the purposes of this paper. Given the less demanding underlying data requirements for its estimation, the number of countries for which we can find comparable data increases significantly. The World Bank has recently published the Global Database on Intergenerational Mobility (GDIM (2018)), compiling data on intergenerational persistence of educational attainment for the generation of children born between 1980 and 1989 for 148 countries. I compute (1-IGP) and use this value for each country as a proxy of social mobility. Data on real GDP growth per capita, the outcome variable, is obtained from the Penn World Tables v. 9.1 (Heston et al. (2012)). As is customary in growth regressions, a series of controls are included in some specifications. Human capital is measured as the percentage of the population with secondary education (males and females separately) from Barro and Lee (2013). The price level of investment (relative to that of the US) is used as a proxy for tax distortions, and the initial level of GDP per capita controls for the stylized fact that poorer countries grow faster. Additional controls include the share of investment in GDP, and a measure of trade openness defined as the sum of exports and imports divided by GDP, both obtained from the PWT. Finally, given the that the theoretical model captures an eminently political mechanism, I use an index of democratic institutions obtained from the Polity project.

[14] See Fields and Ok (1999) and Jantti and Jenkins (2013) for a comprehensive analysis of the different theoretical measures of social mobility.

[15] A typical cross-country sample of IGE estimates is found Corak (2006), who analyzes the technical details of a variety of studies, and reports comparable estimates for a group of only 26 countries.

5.2 Correlations

Table 1 shows simple and conditional correlations for two time structures of the data. First, a pure cross-section sample of countries for which variables have been averaged for the period 1980-2018. Second, a panel structure in which for each variable, a 5-year average has been computed, so each observation is a country-5 year period average pair, also for the period 1980-2018. Columns (2) and (4) report the correlation coefficient of market inequality with economic growth and absolute redistribution respectively.[16] Columns (3) and (4) show the number of observations with which the correlations are computed. The results for both structures of the data point to the same conclusions. Regarding the relation of market inequality and economic growth, the simple correlation is negative but very low in absolute value, pointing to a non-clear association between both variables. Anyhow, when splitting each sample by the median level of social mobility, we observe that the magnitude of the negative association increases for low mobility observations (to -0.255 in the cross-section sample, and to -0.203 for the panel sample). Instead, the correlation for relatively high mobility observations is now virtually zero in both cases. Even if weak, this resembles the prediction in part (i) of proposition 1, that states that economic growth is decreasing in inequality, and more so the lower the level of social mobility. The mechanism for this last qualification works its way through fiscal policy: in high mobility economies, an increase in market inequality produces a rise in redistribution that limits the change in net inequality and thus on growth. This is precisely what the correlations in column (4) point out. The positive but low correlations between market inequality and absolute redistribution when no conditioning statement is imposed mask a sharp heterogeneity by social mobility levels. For high mobility observations, the correlation between both variables is around 0.6 both for the cross-section and the panel structures of the data, while is close to zero for observations below the median level of mobility.[17]

5.3 Regressions

In order to control for other determinants of economic performance, I report in table 2 the regression results of different specifications. Columns (1) and (2) report OLS estimates where all variables

[16] Absolute redistribution is defined as the difference between market and net Gini coefficients, and thus captures the effective reduction in inequality brought about by fiscal policy.

[17] Notice that the number of observation significantly drops in column (5) compared with column (3). This is due to the lower availability of data on both market and net inequality coming from different surveys (not imputed) in the SWIID database, as Solt (2019) explains.

Table 1: Simple and Conditional Correlations

	Conditioning Statement	Economic Growth		Absolute Redistribution	
		Correlation	Obs.	Correlation	Obs.
	(1)	(2)	(3)	(4)	(5)
Cross-Section Data					
Market Ineq.	None	-0.135	135	0.099	65
Market Ineq.	Mobility $\geq$ Median	0.019	65	0.633	34
Market Ineq.	Mobility $<$ Median	-0.255	70	0.037	31
Panel Data					
Market Ineq.	None	-0.068	1002	0.113	470
Market Ineq.	Mobility $\geq$ Median	0.011	519	0.589	258
Market Ineq.	Mobility $<$ Median	-0.203	483	0.075	212

Notes: Pearson's correlation using data on market inequality and absolute redistribution from SWIID. Mobility is measured as $(1 - IGP)$ from the GDIM database.

have been averaged for the period 1980-2018.[18] This is an important difference with respect to the specification of Perotti (1996), but preferable in order to account for the clear upward trend in inequality for a majority of countries starting in the 1980's. The second difference, specific to this paper, is the introduction of social mobility in the right hand side of the equation, both by itself as well as interacted with inequality. The theoretical model predicts a differential effect of inequality on growth depending on the level of social mobility, that is captured by the interaction term coefficient. Both columns include the same set of controls, except for the introduction of regional dummies in column (2). The results in both cases are very similar. The coefficients on inequality and the interaction term between inequality and mobility are significant and of the same sign (negative for inequality and positive for the interaction). The overall relation between inequality and growth is negative when the measure of mobility is at its minimum, but increases as mobility rises, turning positive above a cut-off value of social mobility. It is worth noting that the introduction of regional dummies (column 2) does not significantly change the results, and that the controls included present signs in line with the expected direction and previous literature.

Columns (3)-(6) use observations that average each variable for 5-year periods, predating regressors by one period. Columns (3) and (4) include time and country fixed effects, and only differ in the introduction of additional controls.[19] Contrasting with the pure cross-country estimates, the coefficient signs on inequality and the interaction term are now flipped, being positive in the

[18] Real GDP per capita (in logs) in the right hand side is averaged for the period 1980-1990, to control for initial level of development.

[19] Notice that mobility only enters interacted with inequality, as only one point estimate per country is available in the GDIM database, and thus the coefficient on mobility in subsumed in the country fixed effect.

former case and negative in the latter. That is, inequality and growth are positively associated when mobility is low, while negatively related for high mobility observations. Recall the different interpretation of these estimates with respect to OLS, which now capture the effect of inequality on growth within a given country, and in the medium term. Columns (5)-(6) use the difference GMM estimator, which also eliminates between variation of the data and therefore has the same interpretation as the fixed effects estimates. While the signs and magnitudes of the estimated coefficients are similar to the FE case, it is worth pointing that the cut-off level of mobility, above which the effect of inequality turns negative, is now close to 1. This indicates a positive relation between inequality and growth for a vast majority of observations, stronger the lower the degree of social mobility.

5.4 Discussion

The first take away from the results above is that social mobility does influence the relation between inequality and economic growth, as implied by the significance of the interaction term coefficient in all specifications. The fact that controlling for other determinants of economic growth typical in the literature does not dissipate the modulating effect of mobility in the inequality-growth relation limits the potential concern that the social mobility coefficient might be picking up the effect of an omitted variable correlated with it. In particular, the data show a positive correlation between mobility and the level of development (i.e. high income countries present higher degrees of mobility), but including the level of income as a control does not render an insignificant interaction coefficient, implying that social mobility has some additional explanatory power.

A second conclusion is that the previous literature discrepancy between cross-country and within country studies regarding the sign of the relation between inequality and economic growth persists when including social mobility as a modulating factor. The long run cross country results of columns (1)-(2) render a negative association between inequality and economic growth for the average level of social mobility, just as the early studies (i.e. Perotti (1993)). Furthermore, for countries with low mobility levels this negative relation is stronger. For high mobility countries, the relation turns positive at some point. To the extent that richer countries also present higher levels of social mobility, these results are also similar to Barro (2000). The coefficients reported in columns (3)-(6), interpreted as the medium term relation between inequality and growth within a given country, present a positive association for any value of mobility in the sample, mimicking the results of

Table 2: Estimation Results

Dependent Variable: Real GDP per capita Growth						
	OLS		Fixed Effects		Diff-GMM	
	(1)	(2)	(3)	(4)	(5)	(6)
Inequality	−0.297***	−0.231***	0.244***	0.264***	0.324**	0.369***
	(0.107)	(0.088)	(0.078)	(0.079)	(0.137)	(0.136)
Mobility	−22.669**	−22.108***				
	(10.133)	(7.788)				
Inequality x Mobility	0.461**	0.434***	−0.365***	−0.345***	−0.352*	−0.379*
	(0.195)	(0.147)	(0.124)	(0.125)	(0.193)	(0.217)
log(GDPpc)	−0.318	−0.302	−3.545***	−3.585***	−6.350***	−5.232**
	(0.250)	(0.275)	(0.349)	(0.368)	(2.109)	(2.324)
MSE	−0.430	−0.477	0.297	0.076	0.316	0.196
	(0.480)	(0.477)	(0.451)	(0.461)	(0.871)	(0.960)
FSE	0.705	0.606	−0.153	0.242	0.233	0.325
	(0.495)	(0.520)	(0.445)	(0.478)	(0.831)	(0.964)
PPPI	−0.213	−0.139	−0.327***	−0.315***	−0.413***	−0.502***
	(0.160)	(0.108)	(0.090)	(0.092)	(0.108)	(0.111)
Regional Dummies	No	Yes	No	No	No	No
Additional Controls	No	No	No	Yes	No	Yes
Country FE	No	No	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes	Yes
# Observations	112	112	777	768	665	659
R^2	0.095	0.343	0.176	0.190		
Adjusted R^2	0.034	0.256	0.015	0.029		
F Statistic			23.113***	16.679***		
Hansen p-val					0.024	0.002
M1 p-val					0.002	0.003
M2 p-val					0.492	0.427

Notes: Robust standard errors in parenthesis. *, ** and *** indicate significance at the 0.1, 0.05 and 0.01 levels respectively. Additional controls in columns (4) and (6) include the share of investment in GDP, the Polity IV democracy score, and a measure of trade openness.

Forbes (2000).

Finally, we can extract some conclusions from the empirical results in regard to the politico-economic environment of the model and the predictions of propositions 1 and 2. First, cross-country results point to a value of $\alpha < 1$ in terms of proposition 1, more so noting that the coefficient on tax distortions is non-significant. Think of two countries with the same level of initial market inequality, but one with the average level of social mobility and the other with a lower level of mobility. A similar increase in inequality in each of them would produce a reduction in economic growth in both cases, but stronger in the latter case. The model would explain the difference because the more mobile society responds to the raise in inequality by increasing redistribution, while the second further decreases redistributive taxation. Conversely, the results of the within country specifications point to an environment where $\alpha > 1$, in terms of proposition 2. In a low mobility country, higher inequality is correlated with faster growth in the medium term, while for countries with high social mobility, the relation is close to zero.

6 Conclusions

In this paper I evaluate how social mobility affects the predictions of the main theoretical channels about the inequality-growth relationship. When social mobility is included in the politico-economic environment, fiscal policy has redistributive and insurance effects. When relatively rich people have the outside option of tax evasion , rising inequality produces different fiscal effects in societies with different levels of social mobility. In particular, only when mobility is high the relation between inequality and taxation is positive. When mobility is low, the relation turn negative. This result has important implications for the inequality-growth relation, as fiscal policy enhances or ameliorates the different channels proposed in the literature. In models in which inequality produces a negative direct effect on total production due to market incompleteness, the effect on economic growth is especially harmful in less mobile economies. On the contrary, low mobility enhances the growth-promoting effects of inequality in models with investment indivisibilities or heterogeneous marginal propensities to invest. Regarding the indirect political economy channel by which inequality is detrimental to growth because it boosts distortionary taxation, again the result only holds in high mobility societies, and is reversed when mobility is relatively low. When both direct and indirect effects of inequality are taken into account, the total direction of the relation is only pinned down

for specific levels of social mobility. Overall, the paper underlines the importance of including social mobility as an important mediating factor in the analysis of the inequality-growth relationship.

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Appendix

Proof of Lemma 1

Assume that the participation constraint for the high type binds. The constraint (6), using the fact that $\bar{y} = \delta y_H + \delta y_L$, is given by:

$$\pi \log\left((1-\tau)y_H + \tau\bar{y} - \phi\bar{y}\frac{\tau^2}{2}\right) + (1-\pi)\log\left(\frac{\bar{y}-\delta y_H}{1-\delta} + \tau\frac{\delta}{1-\delta}(y_H - \bar{y}) - \phi\bar{y}\frac{\tau^2}{2}\right) =$$
$$\pi\left[\theta\log((1-\eta)y_H) + (1-\theta)\log y_H\right] + (1-\pi)\left[\theta\log\left((1-\eta)\frac{\bar{y}-\delta y_H}{1-\delta}\right) + (1-\theta)\log\left(\frac{\bar{y}-\delta y_H}{1-\delta}\right)\right] \tag{A.1}$$

Differentiating with respect to y_H, we obtain the following expression:

$$\frac{\partial\tau}{\partial y_H} = \frac{2\pi - 1 + \frac{(1-\pi)(1-\tau)\delta}{(1-\delta)c_L} - \frac{\pi(1-\tau)}{c_H}}{\frac{1-\pi}{c_L}\left((y_H-\bar{y})\frac{\delta}{1-\delta} - \tau\bar{y}\phi\right) - \frac{\pi}{c_H}(y_H - \tau\bar{y}\phi)} \tag{A.2}$$

Where (c_H, c_L) denote the consumption of the individual when he receives a high and low endowment respectively, if he complies. With some algebra, we can find the level of social (im)mobility, $\pi^* \in [\frac{1}{2}, 1)$, such that $\frac{\partial\tau}{\partial y_H} = 0$:

$$\pi^* = \frac{1 - \frac{\delta}{1-\delta}(1-\tau)\frac{1}{c_L}}{2 - \frac{\delta}{1-\delta}(1-\tau)\frac{1}{c_L} - \frac{1}{c_H}(1-\tau)} \tag{A.3}$$

Notice that the expression in (A.2) is a decreasing function of τ, which takes the value $\frac{1}{2}$ when $\tau = 1$, and some value below 1 when $\tau = 0$. Parts (ii) and (iii) can be proved showing that $\frac{\partial\tau}{\partial y_H} > 0$ for $\pi = \frac{1}{2}$ and $\frac{\partial\tau}{\partial y_H} < 0$ for $\pi = 1$ respectively. Starting for the latter case, imposing $\pi = 1$ in equation (7) we get:

$$\frac{\partial\tau}{\partial y_H} = \frac{1 - \frac{1-\tau}{c_H}}{-\frac{1}{c_H}(y_H - \tau)} < 0 \tag{A.4}$$

If $\pi = \frac{1}{2}$, expression (A.2) reduces to:

$$\frac{\partial\tau}{\partial y_H} = \frac{\frac{(1-\tau)\delta}{(1-\delta)c_L} - \frac{(1-\tau)}{c_H}}{\frac{1}{c_L}\left((y_H-1)\frac{\delta}{1-\delta} - \tau\phi\right) - \frac{1}{c_H}(y_H - \tau\phi)} \tag{A.5}$$

Equation (10) is non-negative for any tax rate $\tau \in [0,1]$, as long as $\delta y_H < 1/2$, which is assumed to hold. ■

Proof of Proposition 1

The proposition is easily proved analyzing the sign of each term in equation (8) in the text, depending on the values of α and ϕ. The second bracket in the first term of the equation (direct effect) is always positive, and decreasing in the level of social mobility. The first bracket in the direct effect term depends on the value of α: it is positive when $\alpha > 1$, negative when $\alpha \in (0, 1)$, and zero when $\alpha = 1$. Finally, the sign of the last term in the equation (indirect effect) depends on the level of social mobility, as it determines the sign of $\frac{\partial \tau^*}{\partial y_H}$. We can now prove each part of the proposition:

Part (i). When $\alpha \in (0, 1)$, the first term in brackets is always negative as long as there is no full redistribution ($\tau^* < 1$), because $\hat{y}_H > \hat{y}_L$, the second bracket is positive, and the last term drops because $\phi = 0$. Therefore economic growth is decreasing in inequality.

Part (ii). For $\alpha > 1$, the first bracket is always positive as well as the second, while the last term is zero again, so $\frac{\partial e^g}{\partial y^H}$ is positive.

Part (iii). For $\alpha = 1$, the direct effect is zero, and the sign of the indirect effect depends on the sign of $\frac{\partial \tau^*}{\partial y_H}$. For $\pi > \pi^*$, the derivative is negative and thus the total effect turns positive, while for $\pi < \pi^*$ the derivative is positive and the indirect effect is negative.

Finally, the fact that $\frac{\partial \tau^*}{\partial y_H}$ is a decreasing function of π suffices to prove that in all cases, the effect of inequality on growth is decreasing in social mobility (increasing in π). ■

Proof of Corollary 1

In parts (i) and (ii), $\phi = 0$ so the derivative of e^g with respecto to $(1 - \pi), \theta$ and η is just:

$$\frac{\partial e^g}{\partial (1-\pi)} = \delta\alpha \left[\left(\hat{y}^H\right)^{\alpha-1} - \left(\hat{y}^L\right)^{\alpha-1} \right] \cdot \left[\frac{\partial \tau}{\partial (1-\pi)} (\bar{y} - y^H) \right] \tag{A.6}$$

$$\frac{\partial e^g}{\partial \theta} = \delta\alpha \left[\left(\hat{y}^H\right)^{\alpha-1} - \left(\hat{y}^L\right)^{\alpha-1} \right] \cdot \left[\frac{\partial \tau}{\partial \theta} (\bar{y} - y^H) \right] \tag{A.7}$$

$$\frac{\partial e^g}{\partial \eta} = \delta\alpha \left[\left(\hat{y}^H\right)^{\alpha-1} - \left(\hat{y}^L\right)^{\alpha-1} \right] \cdot \left[\frac{\partial \tau}{\partial \eta} (\bar{y} - y^H) \right] \tag{A.8}$$

It is straightforward to show that $\frac{\partial \tau}{\partial (1-\pi)}$, $\frac{\partial \tau}{\partial \theta}$ and $\frac{\partial \tau}{\partial \eta}$ are all positive, so the sign of the second term is brackets is always negative. The first term in brackets is negative when $\alpha \in (0, 1)$, and positive when $\alpha > 1$, which proves the results in (i) and (ii). ■

Proof of Proposition 2

Again starting from equation (8) in the text, we can analyze each case in the proposition.

Part (i). We know from proposition 1 that the direct effect (first term in eq. 8) is always negative. We also know that the indirect effect is negative when $\pi < \pi^*$, thus in this case the total effect of inequality on growth is unambiguously negative. For $\pi > \pi^*$, the indirect effect is positive (tax

rates decrease and also distortions), and thus the total effect will depend on the strength of each effect.

Part (ii). When $\alpha > 1$ the direct effect of inequality on growth is positive. Further, for $\pi > \pi^*$ the indirect effect is also positive, and thus the total effect is positive. For $\pi < \pi^*$, the indirect effect is negative and again the total effect will depend on the relative strength of both channels. ■