To get Rich is Glorious, but only if Fairly

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Abstract

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The United States witnessed an increase in pre-tax inequality, a rise in the wealth-to-income ratio, and an extraordinary rise in top income inequality in the last four decades. However, income and wealth tax rates did not increase. To explain this, we build a political economy model in which people care about fairness and approve of getting rich due to creating value rather than extracting value from others. Simulations and calibrations show that rational voters can allow for low levels of redistribution even as they observe a sharp increase in inequality.

Keywords: Political Economy; Fairness; Redistribution; Globalization.

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1 Introduction

Why did pre-tax inequality increase and taxation decrease in the United States from the 1980s on? Why has the wealth-to-income ratio grown without the people demanding more redistribution (Piketty, 2013)? If income tax rates result from informed people's policy choices, why did taxation in the U.S. not increase along with the increase in skill premia? As the mean voter income gets lower than the mean, we should have observed a rise in taxation. Instead, tax rates permanently decreased in the 80s. What is more interesting, such a decrease seems to correlate with the view that hard work rather than luck determines income (GSS, 2020). Therefore, as disparities in income due to a more skewed distribution of returns to abilities increased, taxation decreased, increasing inequality in the American economy and society.

We think this is a clear case in which the voters must have perceived inequality as fair. As claimed in Alesina and Angeletos (2005) and Alesina et al. (2012), individuals view enrichment as acceptable if it comes from the higher ability to create value through hard work. Instead, they view purely extractive redistributions as unfair.

We conjecture that events in the 1980s (globalization, technological change, etc.) caused an increase in the returns to highly skilled individuals' abilities and decreased the returns to less-skilled individuals in the U.S., thus widening inequality. These events generated a rise in wage polarization (see Acemoglu, (2002), Author (2014) and Cozzi and Impullitti (2016)). Consequently, they have induced a change in ideology and the preferences for redistribution.

This paper is related to two strands of literature. First, we build on the work of Alesina and Angeletos (2005) and Alesina et al. (2012), as we assume that individuals care about fairness and are willing to vote for a higher level of redistribution if they believe that income rises were unfair. While an increase in income and wealth due to abilities and effort is considered fair as they create value, an increase in income depending on zero-sum luck is unfair. It unequally redistributes wealth rather than making any value. After the seminal work by Alesina and Glaeser (2004) described the many differences in economic ideology between U.S. and Europe, the impact of fairness in determining voting preferences has been studied extensively, both empirically and theoretically. More recently, the result of ideology in shaping political and redistributive preferences has been explored by Alesina et al. (2018), Almås et al. (2020), and Roth and Wohlfart (2018). Alesina et al. (2018) study the effects of optimism and pessimism in the U.S. and various European countries, finding that left-wing voters are more pessimistic about the scale of social mobility. Almås et al. (2020) provide a social policy experiment comparative study between the U.S. and Norway, showing that American and Norwegian differ significantly in their fairness views. That overall fairness is a more critical factor for accepting inequality compared to efficiency. Finally, Roth and Wohlfart (2018) find that individuals who experienced inequality are less in favour of redistribution and related to their views about fairness.

Differently from the existing works on the impact of beliefs about fairness on redistribution, we build a model that generates a Pareto tail distribution for high levels of wealth and shows how a skill premium change is responsible for decreasing taxation and increasing inequality. Hence, our work also speaks to Benhabib et al. (2011) and Benhabib et al. (2019). In particular, we follow Benhabib et al. (2011) in proving that the tail of the stationary distribution of wealth follows a Pareto Law.

Recently, especially after Piketty (2014) opened a lively debate, there has been a renewed interest in studying the shape and determinants of the right tail of income distribution (see for example Atkinson et al. (2011), Kuhn and Ríos-Rull, (2016), and Vermeulen (2016)). Several mechanisms can generate power laws in economics (see Gabaix, 2009). The literature has identified multiple channels that can shape the wealth distribution's tail into exhibiting Pareto properties. One of the main canals is due to shocks to individuals' endowments: Castaneda et al. (2003) find that uninsured idiosyncratic shocks to individuals' endowments of efficiency labour units are influential in shaping the right tail of income distribution. Similarly, Benhabib et al. (2011) identify capital risk as a driver for the Pareto tail, and Benhabib et al. (2019) focus on skewed earnings, differential saving rates across wealth levels, and idiosyncratic stochastic returns to wealth, with the latter being the strongest candidate in explaining the U.S. distribution. Nirei and Aoki (2016) solve a similar model numerically. Cagetti and De Nardi (2006) and Quadrini (2000) use a similar idiosyncratic shock on entrepreneurial risk.

Therefore, our work bridges the two strands of literature. To the best of our knowledge, it provides the first model that can incorporate both preferences for fairness and a distribution of wealth that approximates a Pareto Law, thus allowing an investigation of the effects of ideology in shaping the preferences for redistribution for significant levels of inequality. This article shows how the increase in inequality in the U.S. in the past 40 years, with a simultaneous redistribution decrease, results from a combination of increased skill premia and fairness as a driver for redistributive preferences. While it is not entirely possible to solve the model mathematically, we provide simulations focused on the effects of changes in skill premia and changes in levels of luck, showing that for redistribution to decrease, voters must be driven by an appetite for fairness rather than equality. Finally, we calibrate the model on U.S. data, recreating the evolution of tax, wealth, top wealth, and wealth to income ratio between 1975 and 2015.

The rest of the paper proceeds as follows: Section 2 presents some stylized facts, Section 3 presents the model, section 4 simulates the models and calibrates them to U.S. data, and Section 5 concludes.

2 Stylized Facts

During the last decades, the cost of trade has decreased substantially as a result of technological improvements. Both air and maritime freight transport have seen a substantial decline in prices. According to Hummels (2007), a significant proportion of the decrease in air freight cost was due to the jet engine's introduction between 1957 and 1972, which increased fuel efficiency. Moreover, the reduction in revenues pairs with a substantial increase in the number of goods transported. As a result, the decrease in transportation costs and the rise in globalization affected trade as a percentage of GDP, causing a substantial increase over the years. Simultaneously, there has been a change in the US skill premium (see Cozzi and Impullitti (2016)): an increase in trade and international competition can polarize skill premia and increase inequality. However, if voters were individualistic, following such an increase in skill premium, we should have observed a steady rise in taxation, redistributing wealth towards the workers penalized by technological changes and globalization. However, the opposite happened. While in 1981, the top income tax rate in the US was 70%, by the last year of the Reagan mandate (1989), it had dropped to 28%, decreasing by 60%. After that, the top income tax increased again but plateaued around 40% (see Figure A1 in the Appendix). As a result of the change in skill premium and taxation, inequality rose in the US: between 1980 and 1993 alone, the Gini ratio increased by 13% (see Figure A2 in the Appendix).

Following the literature, let's assume that the trade increase was responsible for augmented skill premium and partially responsible for the rise in inequality. In that case, it is unclear why voters did not choose to increase taxation but instead accepted a decrease in top income taxation and redistribution. We conjecture that individuals viewed that change in inequality as fair and dependent on higher abilities rather than sheer luck.

In Figure 1, we show the change in the belief about luck's importance in determining success in the US. We use data from the General Social Survey (GSS), which started in 1972 and contains data available up to 2018. The question we are interested in is: "Some people say that people get ahead by their own hard work; others say that lucky breaks or help from other people are more important. Which do you think is most important? 1- hard work, 2- equally, 3- luck or help". The question was asked discontinuously from 1973 until 1987 and continuously after. We plot the average responses of all individuals between the age of 18 and 70[1] for each available year since 1975. Figure 1 shows a strong negative relation between years and the belief that success depends on luck, with a correlation of -80%. If success depends on hard work, then the poor are not just unlucky, but they lack the willingness to work hard.

The decline in the belief that luck is essential in life parallels the decreases in redistribution and taxation of top income shown in Figure A1 in the appendix. Thus, if poor people are unwilling to work hard from the voters' perspective, they do not deserve to receive help and transfers, and the increase in inequality is perfectly acceptable.

Stylized facts show an increase in the share and level of trade in the US over the years, which correlated with an increase in the higher education skill premium (see Cozzi and Impullitti (2016)). Given that the median and mean voter are poorer than the average university-educated individual, the rise in skill

[1] We eliminate the first two years as they are outliers compared to the rest of the sample.

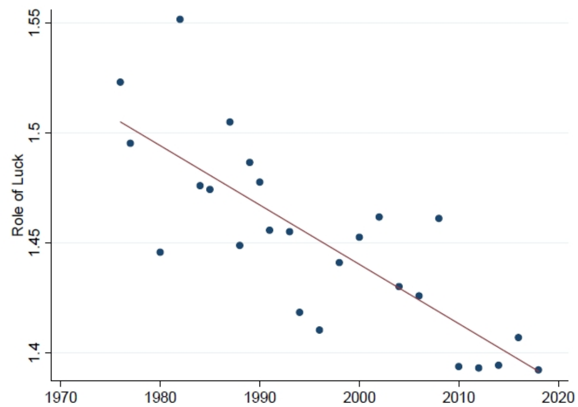

Figure 1: Role of Luck

premium and inequality should have caused an increase in taxation. On the other hand, top income taxation decreased over time. A possible explanation is that individuals do not vote against inequality but somewhat against unfairness (see Almås et al. (2020)). As a result, if inequality is fair because it reflects abilities and effort, then there is no reason to reduce disparities, and taxation should decrease.

3 The economy

The economy is populated by non overlapping generations of individuals, indexed by t. The size of the population is constant, there is one active individual per-family, and the total mass of families is normalized to one. Each individual, indexed by $i \in [0,1]$, lives for one period and has a certain level of luck, $\eta_{it} \in R$, and inner abilities with common average and a stochastic component, $\overline{x}(1+a_{it})$. Average luck is zero, that is $\int_0^1 \eta_{it} di = 0$, and the stochastic component of the abilities is normally distributed $a \sim N(0, \sigma^2)$. Each individual faces a productivity shock $e^{\gamma_{it}}$, with $\gamma \sim N(0, \sigma^2)$, that affects both income and capital and can be interpreted as multiplicative luck. The shocks to productivity are idiosyncratic among individuals and stochastic across generations, but are not i.i.d. We assume that family matters and that productivity shocks are partially inherited from the parent, following a Markov process.

Each individual i cares about consumption, c_{it}, and how much wealth to bequeath to the next generation, k_{it} - which we label "capital". Effort, h_{it}, on the job enters negatively in the utility function, and it is augmented by the productivity shock γ_{it}. This assumption is necessary to guarantee a negative income effect to counterbalance the positive substitution effect deriving from the multiplicative effect of productivity shocks[2]. All choice variables are constrained to be non-negative. The private utility function is:

$$u_{it} = \frac{1}{(1-\alpha)^{1-\alpha}\alpha^{\alpha}} c_{it}^{1-\alpha} k_{it}^{\alpha} - \frac{1}{2} e^{\gamma_{it}} h_{it}^{2}, \tag{1}$$

with $0 < \alpha < 1$. The end of life gross wealth is:

$$z_{it} = (\overline{x}(1 + a_{it})h_{it} + k_{it-1})e^{\gamma_{it}} + \eta_{it} \tag{2}$$

For the moment we assume there is no redistribution in the economy. Maximizing u_{it} subject to $c_{it} + k_{it} = w_{it}$ we obtain that:

$$u_{it} = z_{it} - \frac{1}{2} e^{\gamma_{it}} h_{it}^{2}, \tag{3}$$

And the optimal effort is $h_{it}^{*} = \overline{x}(1 + a_{it})$.

3.1 Stationary Pareto Distribution of Wealth

The difference equation that maps z_{it-1} into z_{it} is given by:

$$z_{it} = A_{it} z_{it-1} + B_{it}$$

Where A_{it} and B_{it}:

$$A_{it} = \alpha e^{\gamma_{it}}$$

$$B_{it} = \overline{x}^{2}(1 + a_{it})^{2} e^{\gamma_{it}} + \eta_{it}$$

$(A_{it}\ B_{it})_t$ are therefore stochastic processes both induced by the stochastic process $(\gamma_{it})_t$, as well as depending by the individuals' abilities (which have a common mean and a stochastic component), luck (which is i.i.d.), and optimizing choices on bequest and effort. If A_{it} and B_{it} were i.i.d., provided the existence of the mean of the distribution z_{it} in each generation, it would be possible to describe $(z_{it})_t$ as a Kesten process (see Kesten (1973), Gabaix (1999), and Gabaix (2009)). However, in our case not only A_{it} and B_{it} are correlated since both depend on the same stochastic process $(\gamma_{it})_t$, but both are also autocorrelated due of the Markovian nature of $(\gamma_{it})_t$.

Therefore, in order to prove that the tail of the stationary distribution follows a Pareto Law, following Benhabib et al. (2011), we first must prove that the distribution of wealth is ergodic, so that the limit of the stationary distribution

[2] In other words without this assumption we would be implying that lucky individuals necessarily work harder than unlucky individuals.

of $(z_{it})_t$ exists and is unique, and then we can apply Theorem 1 by de Saporta (2005) to characterize the tail of stationary distribution.

Following de Saporta (2005) first we need to make assumptions on the process $(\gamma_{it})_t$, and therefore on the induced processes $(A_{it}\ B_{it})_t$:

Assumption 1: The process $(\gamma_{it})_t$ is an irreducible, aperiodic, stationary Markov chain with finite state space $\Gamma = \{\overline{\gamma}_1, ..., \overline{\gamma}_p\} \subset \mathbb{R}^*$, and transition matrix $P_{ij'} = \Pr(\gamma_{j'}|\gamma_i)$.

We also need to prove that $(A_{it}\ B_{it})_t$ are reflective processes, so that B_{it} is bounded and bigger than 0, while A_{it} is almost always smaller than 1, with some exception. This will guarantee that the process will converge to a stationary distribution. We define $A(\Gamma) = \{\overline{A}_1, ..., \overline{A}_p\}$ as the state space of $(A_{it})_t$, which is trivial since A_{it} is a fixed proportion α of $e^{\gamma_{it}}$. Following Benhabib et al. (2011) we define:

Assumption 2: Γ and P are such that: (i) $\Gamma >> 0$, (ii) $PA(\Gamma) < 1$, (iii) $\exists\ \overline{\gamma}_i$ such that $A(\overline{\gamma}_i) > 1$, (iv) all the elements of the diagonal of the transition matrix are positive $P_{ii} > 0$ for any i.

This implies directly that the elements of the diagonal of the transition matrix for A are positive. This is needed to prove that z_{it} will converge to a stationary distribution:

Lemma 1: Assumption 2 implies that $(A_{it}\ B_{it})_t$ are reflective processes. It therefore satisfies: (i) $(A_{it}\ B_{it})_t > 0$, (ii) $E(A_t|A_{t-1}) < 1$ for any A_{t-1}, (iii) $\overline{A}_i > 1$ for some $i = 1, ..., n$.

The last step before we present Theorem 1 is to show that $(A_{it}\ B_{it})_t$ satisfies the regularity assumption, to guarantee the randomness of wealth.

In order for $(A_{it}\ B_{it})_t$ to satisfy the regularity assumption it is sufficient that:

$$\Pr(A_0 y + B_0 = y|A_0) < 1 \text{ for any } y \in \mathbb{R}_+$$

Proof. Lemma 1: It should be noticed that if we would have analyzed the normalized wealth process, as for example in Gabaix (1999), then we could have directly replace (ii) with $E(A) < 1$, because working with the normalized wealth process would have guaranteed the existence of the mean for the stationary distribution of wealth.

Following Benhabib et al. (2011) we need to show that $(A_{it})_t$ and $(B_{it})_t$ are non negative and bounded in $(\gamma_{it})_t$. For $(A_{it})_t$ it is trivial since $e^{\gamma_{it}}$ and α are always positive, also, given that in each period the mean of $e^{\gamma_{it}} = 1$, and that $\alpha < 1$, we guarantee that almost all $A_{it} < 1$ with some exceptions. On the other hand in each generation $\min(B_{it})$ will be equal to:

$$\min(B_{it}) = \overline{x}^2(1 + \min(a_{it}))^2 \min(e^{\gamma_{it}}) + \min(\eta_{it})$$

Therefore as long as we impose that:

$$\overline{x}^2(1+\min(a_{it}))^2\min(e^{\gamma_{it}}) \geq \min(\eta_{it})$$

by truncating the tails of the normal distribution of η_{it} then consequently:

$$\min(B_{it}) \geq 0$$

Moreover, in each generation the mean B_t will always be positive since $\int_0^1 \eta_{it} di = 0$. Given that $\overline{x}$ is a parameter and a_{it} are drawn from the same distribution in each year and have mean 0, ultimately B_t depends on γ_t.

Finally, given the nature of A_t assumption 2ii implies directly that ii, and Assumption 3iii also directly implies $\overline{A}_i > 1$ for some $i = 1, ..., n$. ■

And that $(A_{it})_t$ is non-lattice, so that elements $\log|\overline{A}_i|$ are not integral multiples of the same number[3].

Now that we proved that z_{it} will converge to a stationary distribution and that wealth has a random component, following Benhabib et al. (2011), we are ready to present Theorem 1:

Theorem 1 ***1:*** *Consider the wealth accumulation process:*

$$z_{it} = A_{it}z_{it-1} + B_{it}$$

And that $(\gamma_{it})_t$ satisfies assumptions 1 and 2, as well as the regularity condition. Then the tail of the stationary distribution of z_{it} is asymptotic to a Pareto law

$$\Pr(z_i > z) \sim rz^{-\mu}$$

where $\mu > 1$ satisfies

$$\lim_{T\to\infty}\left(E\prod_{t=0}^{T-1}(A_{i,-t})^{\mu}\right)^{1/T} = 1$$

Proof. Theorem 1: Following de Saporta (2005) Theorem 1, and Benhabib et al. (2011) Theorem 1, we need to prove that there is a $\mu > 1$ such that the transition matrix $P_\mu = diag(\overline{\gamma}_i)P'$ has a spectral radius 1:

de Saporta (2005) establishes that $\lim_{T\to\infty}\left(E\prod_{t=0}^{T-1}\left(\gamma_{i,-t}\right)^{\mu}\right)^{1/T} = \rho(\Gamma^{\mu}P^{'})$, where $\rho(\Gamma^{\mu}P^{'})$ is the spectral radius of $\Gamma^{\mu}P^{'}$, so that $\rho(\Gamma^{\mu}P^{'}) = 1$. Therefore we need to prove that there exists a λ that solves $\rho(\Gamma^{\mu}P^{'}) = 1$, and that such

[3] See de Saporta (2005), condition 2, Theorem 1.

$\mu > 1$. Following Benhabib et al. (2011) we know that, given (i) the ergodicity of $(\gamma_{it})_t$, (ii) the Assumption 2(ii) $P\ A(\Gamma) < 1$, and (iii) the fact that $(\gamma_{it})_t$ is an irreducible, aperiodic, stationary Markov chain, the proof the of Theorem 1 follows. ■

3.2 Taxation and Redistribution

Each generation votes on the proportional tax rate, τ_t, which is applied to end-of-life gross wealth z_{it}; tax revenues are redistributed lump sum to all individuals, and the government budget is always balanced. End of life post-tax and transfer wealth is:

$$w_{it} = (1 - \tau_t) z_{it} + G_t, \tag{4}$$

where $G_t = \tau_t \int_0^1 z_{0it} di$ is the percapita transfer.

In this case the individual utility becomes

$$u_{it} = w_{it} - \frac{1}{2} e^{\gamma_{it}} h_{it}^2, \tag{5}$$

Individuals vote on the tax rate at the beginning of life, before deciding on effort. Maximizing u_{it}, using (1), (2), and (4), gives

$$h_{it} = (1 - \tau_t) \overline{x} (1 + a_{it})$$

which shows the distortion on the supply of effort induced by expected taxation; effort increases with the individual work ability and decreases in the disutility of effort.

The definition of a period needs discussion. As in Alesina et al. (2012), the period is one generation and it is also the length of time for which the redistributive policy cannot be changed.

3.3 Inequality and fairness

In addition to the standard utility function described above, individuals also care about some measure of unfairness. As in Alesina et al. (2012) and Alesina and Angeletos (2005), individuals tolerate inequality from returns to abilities and effort but oppose any inequality arising from luck and government policies, which are not considered fair sources of income. More specifically, "fair" utility and wealth are defined as:

$$\begin{aligned} \widehat{u}_{it} &= \widehat{w}_{it} - \frac{1}{2} e^{\gamma_{it}} h_{it}^2, \\ \widehat{w}_{it} &= (\overline{x}(1 + a_{it}) h_{it} + \widehat{k}_{it-1}) e^{\gamma_{it}}. \end{aligned}$$

As a result, fair consumption, fair bequest, and fair disposable wealth are defined as:

$$\widehat{c}_{it} = (1-\alpha)\widehat{z}_{it}, \qquad \widehat{k}_{it} = \alpha\widehat{z}_{it}, \qquad \widehat{z}_{it} = \widehat{w}_{it} = (\overline{x}(1+a_{it})h_{it}+\widehat{k}_{it-1})e^{\gamma_{it}}. \quad (6)$$

U_{it}, is then defined as:

$$U_{it} = u_{it} - \lambda\Omega_t, \quad (7)$$

where

$$\Omega_t = \int_0^1 (u_{jt} - \widehat{u}_{jt})^2 dj = \int_0^1 (w_{jt} - \widehat{w}_{jt})^2 dj. \quad (8)$$

and $\lambda > 0$ is the parameter that measures the importance of fairness in the economy. This representation of utility implies that individuals dislike deviations from the distribution of wealth/utility. Everybody gets only the benefits from effort and innate ability but tolerate inequality arising from those while disliking inequality (or equality) arising from lack or high government intervention.

The polity, which follows Alesina et al. (2012), is presented in the appendix.

3.4 Equilibrium

After simple substitutions, and momentarily neglecting the party L bias components, we obtain the indirect utility function of each individual in each generation:

$$\begin{aligned} U_{it} = & \left[(\overline{x}^2(1+a_{it})^2(1-\tau_t) + k_{it-1})e^{\gamma_{it}} + \eta_{it}\right](1-\tau_t) \\ & + \tau_t \int_0^1 \left[(\overline{x}^2(1+a_{it})^2(1-\tau_t) + k_{it-1})e^{\gamma_{it}}\right] dj - \frac{1}{2}(1-\tau_t)\overline{x}^2(1+a_{it})^2 e^{\gamma_{it}} \\ & - \lambda \int_0^1 \left[\begin{array}{c} ((\overline{x}^2(1+a_{it})^2(1-\tau_t) + k_{st-1})e^{\gamma_{it}} + \eta_{st})(1-\tau_t) + \\ \tau_t \int_0^1 ((\overline{x}^2(1+a_{it})^2(1-\tau_t) + k_{jt-1})e^{\gamma_{it}})dj - (\overline{x}^2(1+a_{it})^2(1-\tau_t) - \widehat{k}_{st-1})e^{\gamma_{it}} \end{array} \right]^2 ds \quad (9) \\ & \equiv \hat{U}_{it}(\tau_t). \end{aligned}$$

Lemma 2. *In pairwise majority voting, there exists a unique equilibrium in which the two parties will select the same policy variable, $\tau_t^L = \tau_t^R \equiv \tau_t^*$, given by*

$$\tau_t^* = \arg\max_{\tau_t \in [0,1]} \int_0^1 \varphi_i \hat{U}_{it}(\tau_t) di. \tag{10}$$

The proof of Lemma 2 follows directly from Alesina et al. (2012).

The same equilibrium policy variable would also be chosen by a biased social planner who maximizes the following weighted aggregate welfare function:

$$W(\tau) \equiv \int_0^1 \varphi_i \hat{U}_{it}(\tau_t) di, \tag{11}$$

with each individual's indirect utility function (where effort, consumption, and bequest are all optimal) being weighted inversely to vulnerability, $1/\varphi_i$, to party-related attributes. In the special case in which individuals have the same densities $\varphi_i = \varphi$, Lemma 1 implies that $\tau_t^* = \arg\max_{\tau_t} W(\tau_t)$. Note that, from eq. (9), the equilibrium tax rate τ_t^* depends on generation $t-1$'s bequest distribution k_{t-1}, generation $t-1$'s fair bequest distribution $\widehat{k}_{t-1}$, and n the parameter vectors $\overline{x}^2(1+a_{it})^2$ and η; that is $\tau_t^* = \tau^*(k_{t-1}, \widehat{k}_{t-1}, \overline{x}^2(1+a_t)^2, \eta_t, \gamma_t)$.

Under the benchmark symmetry assumption, $\varphi_i = \varphi$, and normalizing by φ, we can simplify the relevant welfare function to:

$$W(\tau_t) = \int_0^1 \hat{U}_{it}(\tau_t) di = \int_0^1 u_{it} di - \lambda \Omega_t$$

The equilibrium tax rate τ_t^* determines the level of capital and fair capital for each family of the current generation. Therefore the link between different generations is summarized by the dynamics of k_{it} and $\widehat{k}_{it}$:[4]

$$k_{it} = \alpha \left\{ \left[(\overline{x}^2(1+a_{it})^2(1-\tau_t) + k_{it-1})e^{\gamma_{it}} + \eta_{it} \right] (1-\tau_t) + G_t \right\} \tag{12}$$

$$\widehat{k}_{it} = \alpha \left[\overline{x}^2(1+a_{it})^2(1-\tau_t) + \widehat{k}_{it-1} \right] e^{\gamma_{it}} \tag{13}$$

[4] Note that the distribution of $(\overline{x}^2(1+a_{it})^2)e^{\gamma_{it}}$ should be high enough relative to the support of the distribution of η_i in order for end of life wealth never to be negative. See Alesina et al. (2012).

4 Intergenerational Dynamics

Starting from an initial vector of actual and fair wealth levels, $(k_{i0}, \hat{k}_{i0})_{i\in[0,1]}$, we use equations (9), problem (10), and eq.s (12) and (13), to iterate the model for an arbitrary number of generations, and calculate the sequence of equilibrium values of the endogenous variables of our dynamic economy for all parameter vectors, initial wealth distributions, and initial fair wealth distributions. By simulating the model for a sufficiently high number of generations, we can approximate the initial steady state value of the endogenous variables associated with each initial condition.

We generate an initial distribution of shocks $\gamma_{i0} \sim N(0, \sigma^2)$, and a transition matrix for the Markov chain which has all positive entries and in which the diagonal elements, necessarily smaller than 1, have the biggest weight in each row. We do this by generating each row of the transition matrix as a random sequence drawn from a uniform distribution. After normalizing all the entries to sum one, we swap the diagonal value with the highest value. In this way, the matrix is of full rank since each row is independent and randomly assigned; there are only positive entries; the matrix is irreducible since there is only one class. The matrix is then aperiodic since we only need one state to be aperiodic (1 positive element on the diagonal would be enough, but by definition, all elements on the diagonal are necessarily > 0).

We set values for parameters $\overline{x}$ and α, and draw in each period η_{it} and a_{it}. from two independent normal distribution[5].

Generation t's pair of distributions $(k_{it}, \hat{k}_{it})_{i\in[0,1]}$ describe the interaction of real and "ideal" variables at time t. More precisely, the comparison between how society currently is - the actual distribution $(k_{it})_{i\in[0,1]}$ - and how society thinks it "should be" - the fair distribution $(\hat{k}_{it})_{i\in[0,1]}$ - sets the goals of the political action; together with the method of political competition - i.e. pairwise majority voting - this describes the political ideology prevailing for generation t in that economy. The resulting political equilibrium generates the evolution of $(k_{it+1}, \hat{k}_{it+1})_{i\in[0,1]}$, and therefore the political ideology (i.e. policy goals) prevailing in the next generation. Thus we trace the evolution of ideology, fairness and redistribution, as well as the aggregate GDP per capita.

4.1 Evolution of top Capital over time

Figure 2 shows a simulation of the model the looks into the effect of an expansion of the abilities distribution. We assume that there are two economies: A and B, which share the same parameters for the first 130 periods prior the shock, to reach the steady state[6]. Following a 10% increase in the scaling of

[5] For the calibration to US data we assume instead the the distribution of endowments do not change over time.

[6] Each country is populated by 1,000 individuals. Since the simulations use normally distributed stochastic component of the abilities and exponential productivity shock (with a seed to be able to replicate the results), which are idiosyncratic among individuals and stochastic across generations, some intergenerational variation in tax and wealth is to be expected.

the distribution of abilities in period 130, Country B (represented by the dotted line) shows a decrease in taxation and an increase in the top income share:

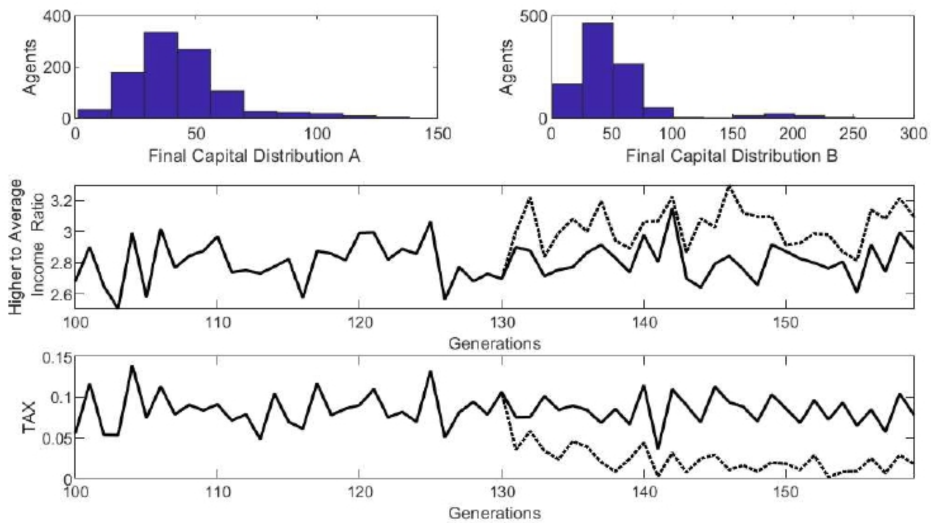

Figure 2: Change in Returns to Abilities

Individuals react to the expansion in the returns to abilities by voting for a lower level of taxation. The reason is that the increase in inequality looks fair: as the inequality depends more on the returns to abilities, the actual distribution of wealth becomes more closely related to the distribution of fairness considered just. The voters' reaction is to support a lower level of redistribution, thus increasing inequality even more.

It is essential to notice that this reaction is dependent on the way ideology is modelled: if individuals believe that wealth reflects abilities, they will be willing to decrease taxation. If, on the other hand, individuals would have thought that luck was responsible for the increase in different returns, then the result would have been the opposite:

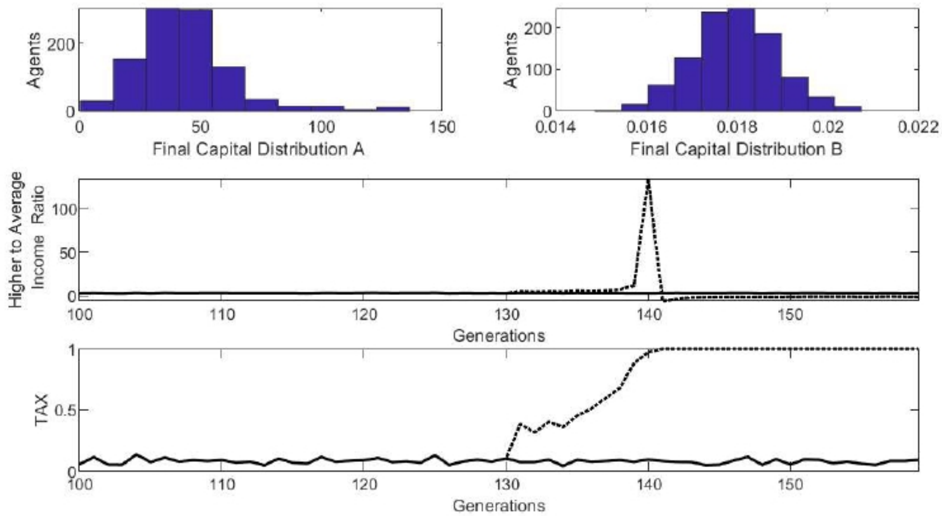

Figure 3: Change in Luck Distribution

In figure 3, we can see that an increase in luck, which has zero-sum, would not affect voters' preferences in the same way. In Figure 3, the initial increase in inequality is met by a rise in outrage for unfair disequality and an increase in taxation, which shoots to one. Therefore, after an initial increase in the higher to average income ratio, given by the rise in luck distribution variance, taxation becomes so high that it decreases the higher to average income ratio to 0. Consequently, the country gets stuck in a poverty trap with no inequality and virtually inexistent effort and capital. This result is an extreme example but shows the importance of the ideology in the reaction to changes.

4.2 Calibration on US data

We calibrate the theoretical model on US data to show the effects of distribution changes to return to abilities in the eighties. Using data from the World Inequality Database and the NBER taxsim, we match the average tax rate, the average wealth, the top wealth share, and the wealth to income ratio dynamics between 1975 and 2015. To be able to create consistently replicable results and clear figures, we fix the distributions of a, η, and the initial distribution of γ.

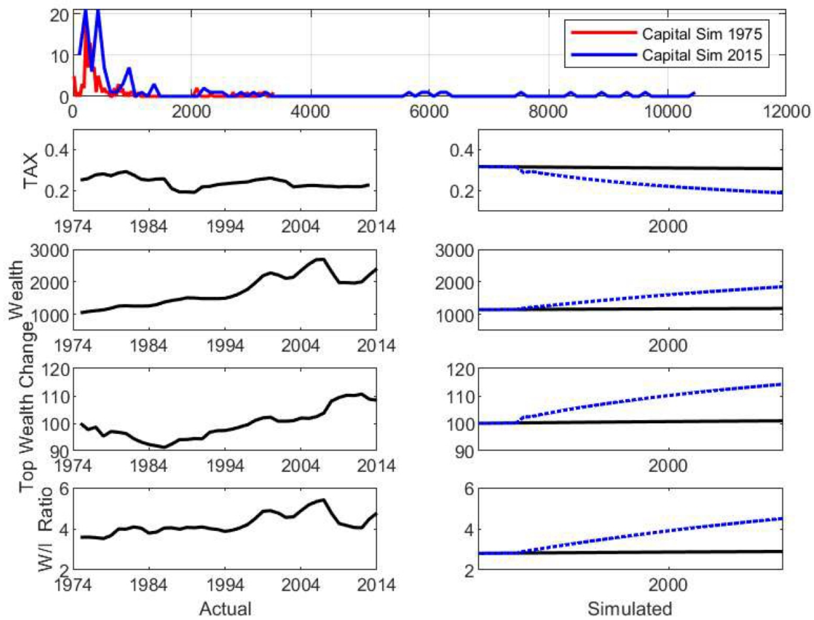

Figure 4: Calibration to US data

The increase in trade and technological change started in the 1980s augmented ability distribution variance, in the simulation, by 3%. We match the overtime trends for the four variables. Income weighted average marginal tax rate decreases from 25.25% in 1975 to 22.93% in 2013. Simultaneously, average wealth (in constant 2016 dollars) changes from \$10,444 to \$24,681, and the share of the top 10% wealth from 67.29% to 73.00%. Finally, the wealth to income ratio varies from 3.59% to 4.82%. Our model can closely imitate these patterns, showing that the change in taxation and inequality in the US in the last 40 years could be attributable to an increase in returns to abilities, perceived as a fair source of income voters.

5 Conclusions

In this paper, we have shown that the increase in inequality and the wealth to income ratio witnessed in the past decade in the United States alongside the decrease in overall redistribution could have resulted from a more decisive role of individual abilities in determining people's economic success. This effect operates through the assumed preference structure, which perceives extractive sources of inequality as unfair and value-creating sources of inequality as fair (Alesina and Angeletos, 2005; Alesina et al. 2012). This paper has shown that culture matters (Cozzi, 1998) and can shape the political economy reaction to changing economic fundamentals. In future research, it would be interesting to compare different countries and how their ruling elites' business model (Casas et al. 2020) mediate the country's adaptation to technological and international changes and study the effect that the Covid-19 pandemic will have on ideology and redistribution.

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Appendix

Figure A1 presents the change in overtime for the tax rate for top incomes in the US after the Second World War. Data comes from the "Federal Individual Income Tax Rate, Adjusted for Inflation" document of the US Tax Foundation. Taxation for top income was very high in 1945, reaching a ceiling of 90%. It is possible to observe a sharp decrease over time, first in 1965 and then a much more substantial reduction in the eighties during the Reagan presidency.

In 1981 the top income tax rate was 70%, and by the last year of the Reagan mandate (1989), it had dropped to 28%. It then increased again to around 40%, still much lower than the tax rate during the sixties and seventies.

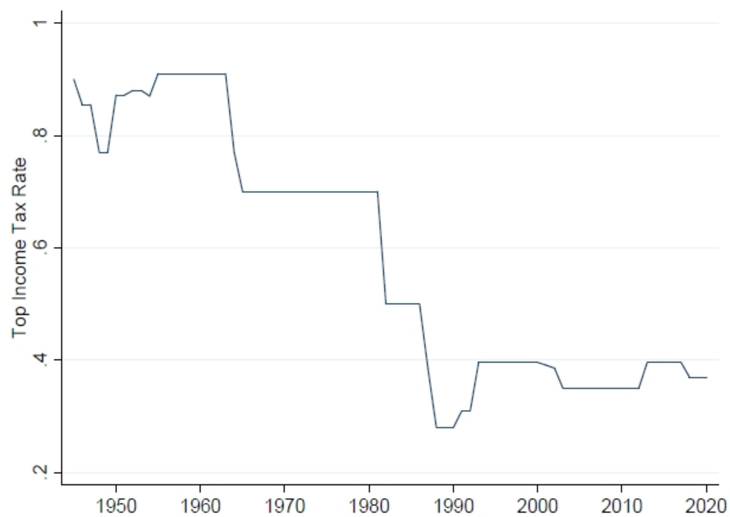

Figure A1: US Top Income Tax

Figure A2 shows the change in the Gini Ratio for families in the US between 1967 and 2019. Data come from the St. Louis Fed Archival Economic Data. After an initial decrease in the level of inequality between 1947 and 1968, the Gini ratio increased. The most significant jump happened between 1980 and 1993 when the Gini Ratio increased by 13%. Therefore, while the tax rate on top incomes presented in table A1 increased, both the skill-premium premium and Gini Ratio were growing.

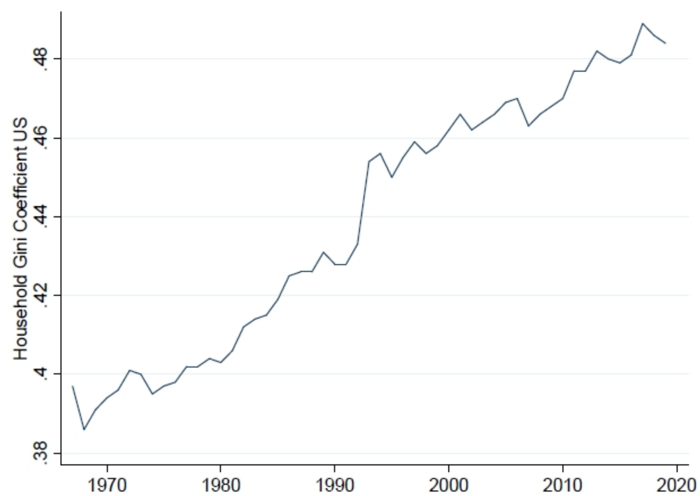

Figure A2: US Household Gini Coefficient

The polity

Following Alesina et al. (2012), we use a probabilistic voting model. We assume there are two parties in the economy , for convenience we call them "left" (L), and "right" (R), which simultaneously propose a tax rate $\tau_P \in [0, 1]$, $P = L, R$. Voters express their preference and the party elected implements the announced tax rate.

Individuals have heterogeneous degrees of party identification:

$$\tilde{U}_{itP} = u_{it} - \lambda\Omega_t + (\sigma_{it} + \varepsilon_t)\chi_L(P), \text{ where } P = L, R.$$

Where P denotes the winning party and $\chi_L(P)$ is 1 if $P = L$ and 0 if $P = R$. The random variable σ_{it} represents individual i's pro-party L bias, which is uniformly distributed on support $\left[-\frac{1}{2\varphi_i}, \frac{1}{2\varphi_i}\right]$. ε_t is an aggregate random variable capturing the party's popularity for time t, and is uniformly distributed on support $\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$. All random variables are independent. Therefore, the density function of aggregate popularity of party L is $\psi > 0$, while the family-specific density functions are $\varphi_i > 0$. The correlated component of the party identification being less variable than the individual components. It should be noticed that the two parties commit to their tax rates before they know the realization of the random variables; and they will choose their policies τ_t^L and τ_t^R by maximizing the probability of being elected.