Rising inequality and the dynamics of welfare-state regimes

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PRELIMINARY VERSION

Abstract

We develop an overlapping generations model where three distinct welfare-state regimes emerge from the interaction between distributive preferences and social norms. Our findings show that rising inequality can lead an intermediate regime to converge toward high redistribution—but only if the increase is anticipated. Otherwise, inequality may push the intermediate regime toward low redistribution, exposing a mismatch between the existing tax system and the one needed for fair redistribution. These results highlight the evolving nature of welfare-state regimes.

Keywords: redistribution, voting behavior, fairness, endogenous preferences

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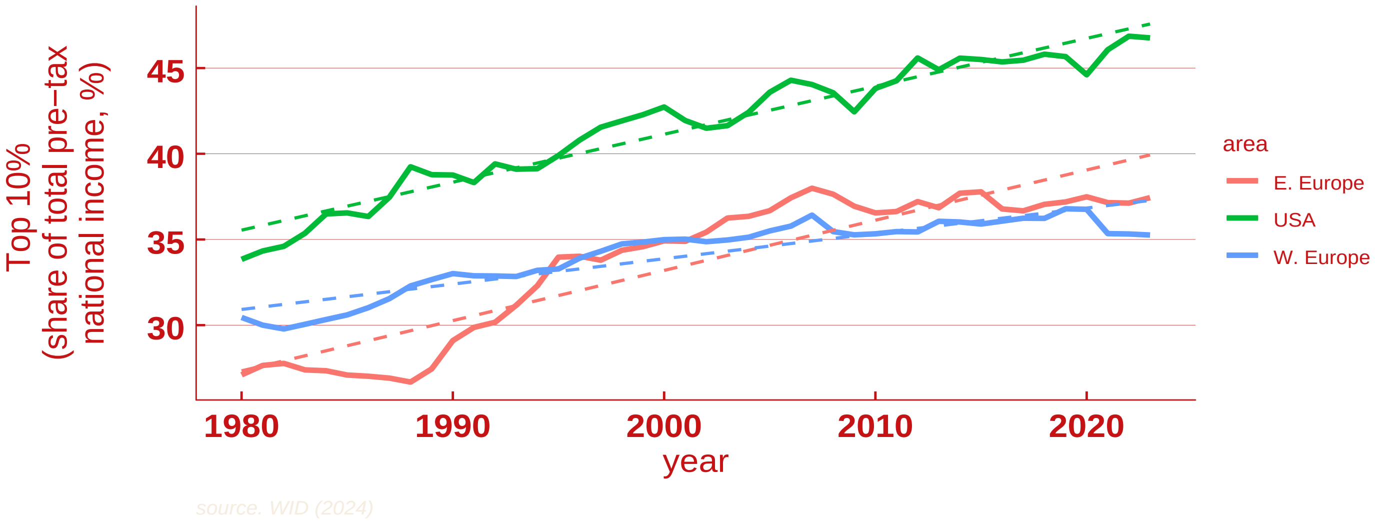

Figure 1: The rise in income inequality since 1980

1 Introduction

Since the early 1980s, income inequality has increased across industrialized countries. As shown in Figure 1, the share of income held by the top 10% has steadily grown in the United States and Western Europe, rising from 34% and 30% in 1980 to 46% and 36%, respectively, by the early 2020s. In Eastern Europe, the fall of the Berlin Wall in 1989 triggered a similar rise in income inequality, with the top 10% income share reaching 37%, up from 27% four decades ago. This trend has strained the redistributive systems of these countries. More profoundly, could it have prompted some nations to reconsider the structure of their welfare states? This article, which focuses on the redistributive aspects of welfare states, addresses this precise issue by assessing the crucial role of rising income inequality.

Welfare states, defined as a set of institutions and policies designed to protect citizens from unfavorable market outcomes and promote fairness in wealth distribution, are typically clustered into three identifiable regimes, according to the seminal study by Esping-Andersen (1990). In the liberal welfare regime, characteristic of Anglo-Saxon countries, support is targeted at the poor, those unable to generate sufficient income in the labor market. Benefits are flat-rate and relatively low, available to those who meet specific eligibility criteria. In contrast, in the social-democratic welfare regime, emblematic of Nordic countries, benefits are universal (available to all citizens) and set at relatively high levels. As a result, social-democratic welfare states engage in more extensive income redistribution compared to liberal welfare states. Lastly, in the corporatist welfare regime, also named Bismarkian, representative of Continental Europe, benefits are also high but tied to contributions jointly paid by workers and their employers. This places the Bismarkian regime in an intermediate position in terms of income redistribution.

In line with Esping-Andersen (1990), Péligry and Ragot (2024) find that the low-taxation group primarily consists of Anglo-Saxon countries such as the United States, the UK, Ireland, New Zealand, and Canada. However, they also emphasize in their statistical study that most Continental European countries (France, Italy, Germany, Belgium, Austria), associated with the corporatist regime in Esping-Andersen's framework (1990) are now grouped within the high-redistribution category, as Sweden, Denmark, Norway and Finland. This finding suggests that the welfare states of these countries have evolved over time to align more closely with the high-redistribution welfare-state regime. It also raises questions about the future of the remaining intermediate regime, which includes Southern European countries (Spain, Portugal, Greece) and Eastern European countries (Poland, Hungary, the Czech Republic, Slovenia, Slovakia, Estonia, and Latvia).

To provide some rationale for these facts, we develop in this article an overlapping generations model that extends the social-norm approach proposed by Le Garrec (2018) by introducing a role for expectations. The outcome of this integration yields a dynamic pattern of redistribution that is both backward- and forward-looking, encompassing historical context and belief-driven factors. Within this model, we liken a welfare-state regime to a stable stationary state. Under certain conditions, three distinct welfare-state regimes emerge, characterized by tax rates $\tau_L < \tau_I < \tau_H$. We then show that rising inequality can drive convergence from an intermediate to a high-redistribution regime, but only if the increase is anticipated. If not, inequality may push the intermediate regime towards a low-redistribution regime, highlighting a disconnect between the current tax system and the one required for fair redistribution.

This article builds upon the literature that connects redistribution with other-regarding motives. Departing from traditional economics, a substantial body of experimental evidence (see Fehr and Schmidt, 2006, for an overview) demonstrates that individuals do not always behave selfishly, as previously assumed. Other-regarding motives play a significant role, especially in understanding attitudes towards income redistribution (Tyran and Sausgruber, 2006; Ackert et al., 2007; Schildberg-Hörisch, 2010; Durante et al., 2014; Rustichini and Vostroknutov, 2014; Lefgren et al., 2016; Kerschbamer and Müller, 2020). For these unselfish motives to translate into support for increased national redistribution, Enke et al. (2023) specify that they must reflect universal moral, meaning impersonal principles not tied to specific groups, family, friends, or socially-related individuals. It is not necessarily the case that universalist individuals are more generous, but, as highlighted by Enke et al. (2023), the inclination to assist a neighbor does not predict support for redistribution, or even the reverse. Among the universal moral values, fairness emerges as a pivotal factor in explaining redistributive policies. To start, when studying redistributive attitudes, surveys consistently reveal that individuals do care about fairness (Fong, 2001; Corneo and Grüner, 2002; Alesina and La Ferrara, 2005; Corneo and Fong, 2008; Alesina and Giuliano, 2011; Almås et al., 2020; Fehr et al., 2021). More specifically, these studies emphasize that people tend to favor greater redistribution if they believe that poverty stems from factors beyond an individual's control, such as luck. In their extensive Swiss population sample, Fehr et al. (2021) estimate that around half of individuals possess social preferences fully grounded in the meritocratic principle, while over a third is partially based on it (consistent with the equity-efficiency trade-off). Purely self-interested individuals constitute only 15%. Additionally, Alesina, Glaeser, and Sacerdote (2001) show that beliefs suggesting luck, rather than effort, determines income[1], are strong predictors of the national level of redistribution, unlike income inequality. This illustrates that fairness-driven motives play a quantitatively substantial role in explaining redistributive policies. Offering an explanation for this stylized fact, Angeletos and Alesina's (2005) model proposes that Americans support only mild redistribution because they believe market outcomes are fair, influenced by hard work instead of luck. In their framework, with an expected high after-tax return to effort, individuals work diligently, which in turn makes market outcomes effectively fair[2]. In essence, Alesina and Angeletos (2005) assert that differences in redistribution persist due to self-fulfilling beliefs about fairness. This article follows this line of reasoning. However, as posited by Luttmer and Singhal (2011), self-fulfilling beliefs alone cannot account for the sustained existence of welfare-state regimes. They argue that diverse beliefs can endure over long periods only if they are embedded in culture. To address this, we expand on Alesina and Angeletos' (2005) approach by introducing the cultural transmission mechanism proposed by Le Garrec (2018), where culture refers to values inherited from previous generations that manifest as behavioral norms. This allows us to derive a more comprehensive welfare-state clustering and subsequently investigate

[1] According to World Values Survey data, they emphasize that 54% of Europeans, as opposed to 30% of Americans, believe that income is determined by luck rather than effort.

[2] Note that there is no consensus on the view that market outcomes are fairer in the US than in Europe. Certainly, as reported by Alesina and Angeletos (2005), the average work time per employee is lower in Europe than in the US. However, nothing seems to support the popular belief that American society is more mobile than European societies. Björklund and Jäntti (1997), Bratberg et al. (2017), and Helsø (2021) even show that intergenerational income mobility in Scandinavian countries may be slightly higher than in the United States. Piketty (1995) and Benabou and Tirole (2006) then explore the role of biased beliefs about social mobility to explain differences in redistribution.

in a meaningful way the conditions for long-term institutional persistence.

This article is also related to the field of cultural economics, which seeks to explain how beliefs, tastes, or preferences are shaped within a society. This process depends on the social environment and the extent to which individuals observe others behaving in particular ways. To assess the cultural component of human behavior, recent studies have highlighted significant and persistent differences between the behaviors of immigrants and natives[3]. Some studies have also employed the diverse life experiences of individuals as natural experiments[4]. Regardless of the strategy employed, empirical findings consistently support the idea that the cultural and political environment in which individuals grow up plays a crucial role in shaping their preferences and beliefs regarding income redistribution (Guiso et al., 2006; Alesina and Fuchs-Schündeln, 2007; Luttmer and Singhal, 2011; Alesina and Giuliano, 2011; Roth and Wohlfart, 2018). For instance, in Luttmer and Singhal (2011), after controlling for individual characteristics, immigrants from countries with a preference for greater redistribution continue to show significant support for higher redistribution in their destination country. As such, preferences for redistribution appear to be to some degree culturally shaped during one's early years, often referred to as *impressionable years*, and tend to stabilize after reaching adulthood[5]. Furthermore, Roth and Wohlfart (2018) show that individuals who experienced higher levels of income inequality during their *impressionable years* tend to support less redistribution later in life. It is worth noting that in Sands (2017), temporary exposure to inequality is shown to have an instantaneous (and most likely temporary) negative effect on the willingness to support redistribution[6]. The findings of Roth and Wohlfart (2018), along with those of Luttmer and Singhal (2011), suggest that it is the prolonged exposure to inequality during one's youth that leaves a lasting impact on an adult's beliefs and preferences for redistribution, even if exposure to inequality is set to change. In this optic, the mechanism of cultural transmission proposed by Le Garrec (2018) specifies how taste is shaped through oblique socialization, involving the

[3]These differences encompass various aspects, such as fertility choices and women's labor supply (Fernández and Fogli, 2006), savings behavior (Carroll et al., 1994), trust (Algan and Cahuc, 2010), and preferences for redistribution (Luttmer and Singhal, 2011; Alesina and Giuliano, 2011).

[4]For instance, researchers have examined events like the German reunification in Alesina and Fuchs-Schündeln (2007) and the impact of the Great Depression in Malmendier and Nagel (2011).

[5]Supporting this perspective, psychologists McCrae and Costa (1994) have shown that personality traits generally stop changing after the age of 30. For further discussion, see Roberts and DelVecchio (2000) and Neundorf and Smets (2017).

[6]Twenge et al. (2007) explain for example that social exclusion elicits strong negative feelings that impair the capacity for empathic understanding of others, and as a result, decreases pro-social behaviour (see Gunther Moore et al., 2012, and Will et al., 2015, for neuroimaging evidence).

observation, imitation[7], and internalization of cultural practices[8]. More specifically, childhood observations of high income inequality, resulting from redistributive policies that are perceived as unfair, weaken concerns for distributive justice[9]. The moral cost of not supporting fair taxation is reduced when observing how the previous generation has collectively failed to implement a fair institution[10]. In other words, this mechanism suggests that exposure to unfairness during youth reduces individual responsibility regarding moral duty later in life.

Finally, this article enhances our understanding of the complex relationship between income inequality and redistributive policies. While the empirical literature, largely based on the canonical Meltzer and Richard (1981) model, has found only mixed support for the predicted positive correlation (see Perotti, 1996; Moene and Wallerstein, 2001; de Mello and Tiongson, 2006), our framework highlights three key challenges. First, redistribution occurs within regimes whose institutions and norms shape different responses to rising income inequality (see also Iversen and Soskice, 2006). Second, as noted by Saint-Paul (2001), the impact of inequality depends on how it is measured. Third, consistent with Benabou and Ok (2001), we emphasize the crucial role of expectations.

The remainder of the paper is organised as follows. In Section 2, we introduce the basic model, which is based on Le Garrec (2018). In this model, the multiplicity of stationary

[7] In evolutionary studies, learning from others through imitation is considered a cost-effective and efficient method for acquiring locally relevant information that aids adaptation. As a result, the tendencies to learn and imitate are aspects of a psychology shaped by natural selection. In this context, the development of social norms and institutions is seen as stemming from the complex interplay between cultural and biological transmission (see Boyd and Richerson, 1985; Boyd et al., 2011; Spolaore and Wacziarg, 2013).

[8] As highlighted by the empirical findings of Dohmen et al. (2012) and discussed by Neundorf and Smets (2017), children's attitudes can also be influenced by the active efforts of parents to transmit their values, a process referred to as vertical socialization. In the theoretical literature on cultural transmission, the socialization process is typically specified through one of its channels (e.g., oblique in Le Garrec, 2018; vertical in Tabellini, 2008) or through both channels, as seen in the seminal work by Bisin and Verdier (2001). The latter framework specifies that when values are sufficiently homogeneous at the regional level, parents have fewer incentives to transmit their own values, and oblique socialization prevails.

[9] This mechanism is supported by Corneo's (2001) finding that individuals in former West Germany exhibited greater concern for distributive justice compared to those in the United States. Similarly, social preferences that align with empirical distributions of wealth and income, considering the actual tax structure, assign greater importance to lower-income individuals in France than in the United States (Le Grand et al., 2022).

[10] Relatedly, in the literature on crime (see Funk, 2005), it is well established that the remorse or guilt felt from breaking social norms is weakened when observing that many others are also committing crimes. Similarly, in Lindbeck et al. (1999), individual guilt and social stigma associated with living on benefits decrease with the number of beneficiaries in society.

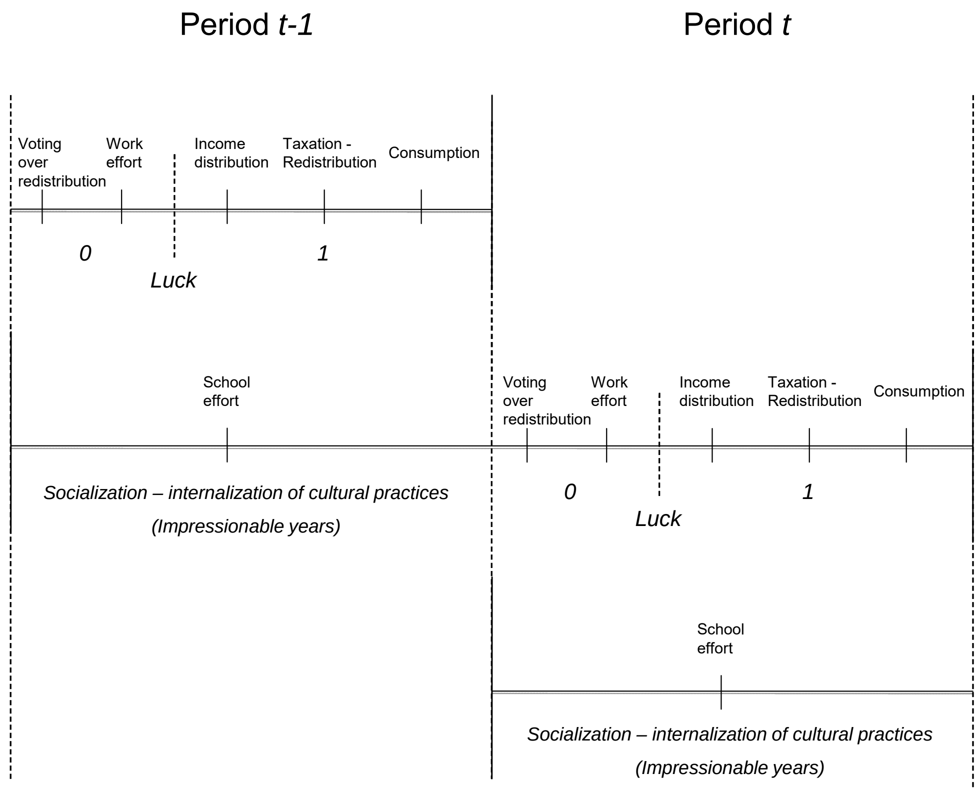

Figure 2: Timing of actions in an overlapping generations model

states arises solely from cultural transmission and norm adherence. Section 3 incorporates endogenous perceptions of fair levels of fair taxation, depending on the social context. By likening a welfare-state regime to a stable stationary state with perfect stable expectations, we show that, under certain conditions, one configuration with three distinct regimes can exist. Whe then show that a rise in inequality may explain the convergence from intermediate regime towards high-redistribution regime only if the rise is anticipated. We discuss this result and conclude briefly.

2 The basic model

The economy is populated by a continuum of mass 1 of individuals at each generation, and their actions follow the timeline depicted in Figure 2. Each individual has a two-period life: childhood (referred to as *impressionable years*) and adulthood. During childhood, they attend school to acquire knowledge and skills, exerting effort to maximize their welfare. In adulthood, they engage in work to maximize their own welfare and the consumption of their household. Additionally, they participate in voting on income redistribution.

2.1 Income and budget constraints

As emphasized in the introduction, an extensive body of literature shows that people are concerned about the equity of market income distribution, where factors beyond one's control, such as luck, contribute to the level of unfairness. Consequently, following the work of Piketty (1995), Alesina and Angeletos (2005), Bénabou and Tirole (2006), and Le Garrec (2018), we assume that an adult's income, denoted as y_{it} at date t, is determined jointly by luck and effort, as follows:

$$y_{it} = A_i \left[\gamma h_{it-1} + (1-\gamma) e_{it}\right] + l_{it} \tag{1}$$

where h_{it-1} denotes the person's chosen effort at school (when young), e_{it} and l_i respectively his chosen effort at work and luck (or misfortune) when adult, $A_i \geq 0$ his talent or ability. $\gamma \in [0,1]$ is a technological parameter that characterizes the relative importance of effort at school in income determination. As the proportion of effort chosen after the tax rate, $(1-\gamma)$ reflects the short-term sensitivity of effort with respect to the tax level. Indeed, if $\gamma = 1$, the level of effort is entirely predetermined when the tax rate is chosen, and the latter cannot have any effect on effort. It is assumed that $\{A_i, h_{it-1}, e_{it}\}$ are private information to agent i. l_{it} is assumed to be unknown prior to income distribution (sub-period 0 in Fig. 2) and satifies $E_{0,t}\left[l_{it}\right] = 0$, with A_i and l_{it} being independent and identically distributed (i.i.d.) across agents. In other words, when making decisions about their effort (both at school and at work), individuals are aware of their potential returns but cannot predict whether they will be lucky or unlucky. After income distribution, l_{it} is assumed to remain private information for agent i (sub-period 1 in Fig. 2). In addition, we assume that the variance of luck follows the following pattern:

$$\sigma_t^2 = \sigma_{t-1}^2 + \varepsilon_t \tag{2}$$

where $\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t$, μ_t being a shock *iid* such that $E_{0,t}\left[\mu_t\right] = 0$, $\rho \in [0,1)$.

At each period t, the government redistribute income according to a simple fiscal scheme characterized by a flat-rate tax τ_t and a lump-sum benefit g_t provided to all adults. Assuming a balanced budget, it yields $g_t = \tau_t \bar{y}_t$, where $\bar{y}_t$ denotes the mean income at date t.

As in Boldrin and Montes (2005) and Docquier et al. (2007) children's only decision is assumed to be regarding education since their consumption is part of their parents' consumption. As a consequence, each adult at date t faces the following budget constraint:

$$c_{it} = y_{it}(1-\tau_t) + \tau_t \bar{y}_t \tag{3}$$

where c_{it} denotes household consumption (one adult - one child) at date t.

2.2 Preferences, fairness and socialization

To take into account the concern for fairness that appears in redistributive attitudes, we consider an extended version of the Bolton-Ockenfels model (2000) of distributive preferences in specifying the life-cycle utility function of an individual born in period $t-1$ (adult in period t) as:

$$U_{it} = u_{it} - \frac{\varphi_{t-1}}{2}\left(\tau_t^f - \tau_t\right)^2 \tag{4}$$

where u_{it-1} denotes the private life-cycle utility (from personal consumption and effort at school and at work), $\tau_t^f \in [0,1]$ the redistributive tax rate that would allow implementing the fair income distribution at date t, and $\varphi_t \geq 0$ the strength of the concern for fairness or inequity aversion that we assume was shaped during childhood. φ_t also characterizes the degree of moral universalism of preferences. In this specification, the level of redistribution perceived as fair at date t corresponds to the level of taxation optimally chosen by each adult of the same date if unfairness aversion is infinitly high: $\tau_t^f = \lim_{\varphi\to\infty} \arg\max_{\tau_t\in[0,1]} \{U_{it}\}$. For clarity, we will consider first that the level of redistribution perceived as fair is exogenous (and unanimously) shared in the population. In the following section, we will endogeneize this perception to distinguish the role of expectations.

Assume that the distributive preferences of a young individual at date t are influenced by the observation of the social environment and its degree of fairness. We characterize the social environment by the concept of social distance[11] to distributive justice:

$$\mathcal{S}_t \equiv \mathcal{S}(\tau_t) = \left[\tau_t^f - \tau_t\right]^2 \tag{5}$$

The higher $\mathcal{S}_t$, the more unfair the redistributive system perceived by the population. As the level of taxation τ_t results from a collective choice of the adults at date t through voting, a significant $\mathcal{S}_t$ reveals a low weight attached to the moral norm adherence and a failure in implementing fair taxation. This low weight is therefore transmitted to the young generation through observation and imitation. Having been exposed to unfairness during youth reduces

[11] See Akerlof (1997) for a presentation of the concept of social distance in various contexts.

the concern for fairness. In the optic of the empirical result of Roth and Wohlfart (2018), we follow Le Garrec (2018) in assuming

$$\varphi_t = \Phi(\mathcal{S}_t), \; \Phi' \leq 0 \tag{6}$$

where φ_t denotes the strength of the concern for fairness developed during youth at date t. This mechanism is closely related to that of Lindbeck et al. (1999) and Funk (2005), where the disutility of deviating from the norm is non-increasing in the fraction of deviators[12]. However, in our setting the choice is not a binary decision between working full-time or living off benefits, as in Lindbeck et al. (1999), or following the law or committing a crime, as in Funk (2005). Therefore, to determine the deviation from the moral norm, the fraction of deviators is replaced by the distance between the collective choice and the norm. In addition, in our model, to characterize the socialization process, the impact on preferences of deviating from the norm applies with a one-generation delay. The moral cost of not supporting fair taxation is reduced when observing how the previous generation has collectively failed to implement a fair institution. In our framework, meritocratic fairness (linked to individual effort, talent and luck) is assumed to be shared by the whole population. Parents have then no incentive to transmit other values, and oblique socialization naturally prevails (see Bisin and Verdier, 2001).

Finally, we express the private life-cycle utility as follows:

$$u_{it} = c_{it} - \frac{1}{2\beta_i}\left[\gamma h_{it-1}^2 + (1-\gamma)\, e_{it}^2\right] \tag{7}$$

where $\beta_i \geq 0$ characterizes a taste for effort that is assumed to be private information to agent i and i.i.d across agents. The quadratic disutility of effort is for analytical simplicity, the parameters $\frac{\gamma}{2}$ and $\frac{1-\gamma}{2}$ are for normalization.

2.3 Optimal behaviors

The optimal efforts resulting from the maximization of the expected life-cycle utility, $E_{t-1}[U_{it}]$ for h_{it-1} and $E_{0t}[U_{it}]$ for e_{it}, are as follows:

$$h_{it-1} = \beta_i A_i (1 - \tau_t^e) \tag{8}$$

$$e_{it} = \beta_i A_i (1 - \tau_t) \tag{9}$$

[12] In a continuum of mass 1 of individuals, if one assigns a distance of one for deviating from the social norm, the social distance equals the fraction of deviators.

where τ_t^e is the anticipated (at date $t-1$) tax rate at date t. As redistribution lowers the market return to effort, it creates a disincentive to effort. In addition, as the taste for effort lowers the utility cost of effort, it enhances the effort. Considering eq. (8), the pre-tax income (1) of an adult in t can be rewritten as:

$$y_{it} = a_i \left[1 - \gamma\tau_t^e - (1-\gamma)\,\tau_t\right] + \varepsilon_i \tag{10}$$

where $a_i = \beta_i A_i^2$ denotes an index of psychological and intellectual efficiency defined thereafter as i's talent which is independant of luck. We normalize the variance of a_i to 1. As the level of effort is reduced by redistribution, the pre-tax income is obviously also reduced. As a consequence, redistribution reduces not only the variance of disposable income, but also the variance of pre-tax income.

In the same vein, an adult at date t will support the level of redistribution that maximizes his expected utility (4). Assuming that the vote occurs at the beginning of the period (Fig. 1) allows the person to take into account the distorting effect of redistribution on work effort and consequently on income. Therefore, considering that he can fully anticipate his future effort choice as a function of the tax rate and has a perception of the fair level of redistributive taxation given the information available in sub-period 0 denoted ${}_0\tau_t^f$, the expected life-cycle utility (before knowing his particular luck) defined by eqs. (4) and (7) can be written, using eqs. (3), (8), (9) and (10), as:

$$\begin{aligned} E_{0t}\left[U_{it}|\ e_{it}(\tau_t)\right] &= \left[a_i(1-\tau_t) + \tau_t\bar{a}\right]\left[1 - \gamma\tau_t^e - (1-\gamma)\,\tau_t\right] \\ &\quad -\frac{a_i}{2}\left[\gamma\left(1-\tau_t^e\right)^2 + (1-\gamma)\left(1-\tau_t\right)^2\right] - \frac{\varphi_{t-1}}{2}\left({}_0\tau_t^f - \tau_t\right)^2 \end{aligned} \tag{11}$$

where $\bar{a}$ denotes the mean a_i. Defining the demand for redistribution of an adult at date t as the level of taxation that maximizes his utility (11) leads then to the following first order condition $(\bar{a} - a_i)\left[1 - \gamma\tau_t^e - 2(1-\gamma)\,\tau_t\right] - a_i(1-\gamma)\,\tau_t + \varphi_{t-1}\left({}_0\tau_t^f - \tau_t\right) = 0$. Therefore, as long as the second order condition $a_i - 2\bar{a} - \frac{\varphi_{t-1}}{1-\gamma} \leq 0$ is satisfied, individual demands for redistribution at date t can be expressed as:

$$\tau_{it} = \begin{cases} \frac{(1-\gamma\tau_t^e)(\bar{a}-a_i)+\varphi_{t-1}{}_0\tau_t^f}{(1-\gamma)(2\bar{a}-a_i)+\varphi_{t-1}} & \text{if } a_i - \bar{a} \leq \frac{\varphi_{t-1}{}_0\tau_t^f}{1-\gamma\tau_t^e} \\ 0 & \text{otherwise} \end{cases} \tag{12}$$

Considering the second order condition, assuming $\max_i\{a_i\} \leq 2\bar{a}$ is a sufficient condition so that preferences are single-peaked in τ_t. Individual demands for redistribution as specified in eq. (12) decrease with personal income and increase with the level of redistribution perceived as fair. From that perspective, eq. (12) is consistent with empirical surveys (Fong, 2001, Corneo and Grüner, 2002, Alesina and La Ferrara, 2005, Corneo and Fong, 2008, Alesina and Giuliano, 2011).

2.4 Policy and multiplicity: the exogenous case

We now assume that, in a democracy, any policy to be implemented must be supported by a majority of adults[13]. In our model, under the sufficient condition $\max_i \{a_i\} \leq 2\bar{a}$, preferences are single-peaked in τ_t. Thus the median-voter theorem applies. Denote by $\Delta = \bar{a} - a_m$ an aggregate index of income inequality[14], where a_m denotes the median a_i, and normalize $a_m = 2$ (without loss of generality). Assuming that the distribution of (squared) talents a_i is skewed to the right yields $\Delta \geq 0$ (so that the median income is lower than the average income as observed). It follows from eqs. (12) and (18) that the tax rate chosen under the majority rule can be expressed as follows:

$$\tau_{t+1} = \xi_t \mathcal{T}^s\left(\tau^e_{t+1}\right) + (1-\xi_t)_0\, \tau^f_{t+1} \tag{13}$$

where $\xi_t = \frac{2(1-\gamma)(1+\Delta)}{2(1-\gamma)(1+\Delta)+\varphi_t} \in (0,1]$, $\mathcal{T}^s\left(\tau^e_{t+1}\right) = \frac{\left(1-\gamma\tau^e_{t+1}\right)\Delta}{2(1-\gamma)(1+\Delta)}$ denoting the preferred tax rate of the pivotal voter conditional to expectation τ^e_{t+1} if voters are only self-interested, i.e., $\varphi = 0$. ξ provides a measure of the proximity of the redistributive tax to the purely self-interested level (relatively to the purely fair level). From that perspective, it is worth noting that ξ increases as income inequality increases, $\frac{\partial\xi}{\partial\Delta} > 0$, increases as the short-term sensitivity of effort with respect to the tax level increases, $\frac{\partial\xi}{\partial(1-\gamma)} > 0$, and decreases as the concern for fairness increases, $\frac{\partial\xi}{\partial\varphi} < 0$.

The unique *selfish* equilibrium with perfect expectations, $\tau^e_{t+1} = \tau_{t+1}$, is then characterized by the following tax rate:

$$\tau^s \equiv \mathcal{T}^s\left(\tau^s\right) = \frac{\Delta}{2(1-\gamma) + (2-\gamma)\Delta} \tag{14}$$

This *selfish* tax rate exhibits the standard Meltzer-Richard (1981) effect: as income inequality rises, the median voter is poorer compared with the average and support then greater redistribution: $\frac{\partial\tau^s}{\partial\Delta} \geq 0$, where $\lim_{\Delta\to 0}\tau^s = 0$ and $\lim_{\Delta\to+\infty}\tau^s = \frac{1}{2-\gamma} \leq 1$. In addition, the tax rate

[13] As put forward by Corneo and Neher (2015), democracies implement to a large degree the level of redistribution demanded by the median voter.

[14] In the empirical literature investigating the link between redistribution and income inequality, the Gini coefficient or the interdecile ratios are often favored to measure income inequality.

decreases as voters internalize the distortion tax effect on effort and income: $\frac{\partial \tau^s}{\partial(1-\gamma)} \leq 0$, where $\lim_{\gamma\to 0}\tau^s = \frac{\Delta}{2(1+\Delta)} \leq \frac{1}{2}$ and $\lim_{\gamma\to 1}\tau^s = 1$.

Under perfect foresight, using eq. (5), we can redefine eq. (13) as:

$$\tau^*_{t+1} = \tilde{\xi}_t \tau^s + \left(1 - \tilde{\xi}_t\right) \tau^f_{t+1} \equiv \Psi\left(\tau^*_t\right) \tag{15}$$

where $\tilde{\xi}_t = \frac{2(1-\gamma)+(2-\gamma)\Delta}{2(1-\gamma)+(2-\gamma)\Delta+\Phi\left(\left[\tau^f_t-\tau^*_t\right]^2\right)} \in (0,1]$, $\tau^*_0 = \tau_0 \geq 0$ given, and $\Psi' \geq 0$ as long as $\tau^*_t \leq \tau^f_t$. $\tilde{\xi}\left(\tau_t\right)$ is the transformed measure with perfect expectation of ξ_t, representing the proximity of the redistributive tax to the purely interested level (relative to the purely fair level): $\lim_{\tilde{\xi}\to 1}\tau = \tau^s$ and $\lim_{\tilde{\xi}\to 0}\tau = \mathcal{T}^f\left(\tau\right)$. It exhibits similar characteristics: $\frac{\partial\tilde{\xi}}{\partial\Delta} > 0$, $\frac{\partial\tilde{\xi}}{\partial(1-\gamma)} > 0$, and $\frac{\partial\tilde{\xi}}{\partial\Phi} < 0$.

Stationary states, defined by $\tau^* = \Psi\left(\tau^*\right)$ where $\tau^f_t = \tau^f$ $\forall t$, then lie necessarily between the selfish and fair tax rates: $\tau^* \in \left[\tau^s, \tau^f\right)$. In addition, stable stationary states are the ones where the graph of Ψ cuts the main diagonal from above, and unstable ones are those where it cuts it from below. Knowing that $\tau^s \leq \Psi\left(\tau^s\right)$ and $\tau^f > \Psi\left(\tau^f\right)$ yields that there exits at least one stable stationary state $\tau^*_{SS} \in \left[\tau^s, \tau^f\right)$. As exhibited in eq. (15), such a stable stationary state is as close to the fair tax rate as the concern for fairness φ is high. Reciprocally, by assuming that being exposed to unfairness during youth reduces the concern for fairness, the mechanism we are exploring states also that the concern for fairness increases as the tax rate becomes fairer: $\varphi = \Phi\left(\left[\tau^f - \tau^*\right]^2\right)$ where $\Phi' \leq 0$. Therefore, if $\lim_{\tau^*\to\tau^f,\ \tau^*<\tau^f}\Phi\left(\left[\tau^f - \tau^*\right]^2\right)$ is sufficiently high, there exists a stable stationary state close to the fair taxation. At the limit $\lim_{\tau^*\to\tau^f,\ \tau^*<\tau^f}\Phi\left(\left[\tau^f - \tau^*\right]^2\right) = +\infty$, it can be shown that $\tau^*_{SS} \to \tau^f$ $\left(\tau^*_{SS} < \tau^f\right)$. Reasoning similarly, it is obvious that a stable stationary state is as close to the selfish tax rate as the concern for fairness φ is low. If $\varphi = 0$, the unique stable stationary state is characterized by $\tau^*_{SS} = \tau^s$. Therefore, if $\lim_{\tau^*\to\tau^{s+}}\Phi\left(\left[\tau^f - \tau^*\right]^2\right)$ is sufficiently low, there exists a stable stationary state close to the selfish taxation. For the following, we then formulate the assumption:

$H1$: *$\varphi = \Phi\left(\mathcal{S}\right)$ is sufficiently high when τ approaches τ^f and sufficiently low when τ approaches τ^s such that equation $\tau^*_{t+1} = \Psi\left(\tau^*_t\right)$ exhibits (at least) two stable stationary states.*

As the graph of Ψ crosses the diagonal an odd number of times which may be greater than 3, the number of stable stationary states may be greater than 2 (we do not consider here the non-generic case of uncountable many crossings). Restricting our attention to the case with only two stable stationary states, we formulate the additional assumption $H2$:

$H2$: *Φ is of class C^2 and equation $\Psi'\left(\tau\right) = 1$ has two roots in $\left(\tau^s, \tau^f\right)$.*

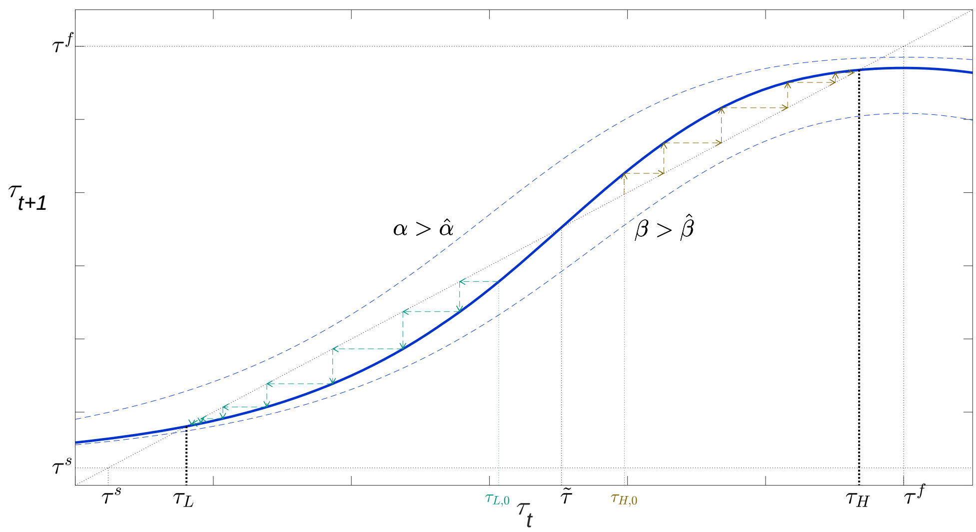

Figure 3: Multiplicty with exogenous perception

To illustrate the case where assumptions $H1$ and $H2$ are satified, take for example the following function $\Phi(\mathcal{S}) = \frac{\alpha}{\beta+\mathcal{S}}$, where α and β are two strictly positive parameters. As is obvious, the concern for fairness $\varphi = \frac{\alpha}{\beta+\left[\tau^f-\tau^*\right]^2}$ is high when τ^* approaches τ^f if $\frac{\alpha}{\beta}$ is high, and low when τ^* approaches $\tau^s < \tau^f$ if α is low. More formally, denoting $\frac{\hat{\alpha}}{\left(\tau^f-\tau^s\right)^2} = \frac{1+\Delta}{4}$ and assuming $0 < \alpha \leq \hat{\alpha}$, then there exists $\hat{\beta} > 0$ such that if $0 < \beta \leq \hat{\beta}$ the model exhibits two stable stationary states τ_L and τ_H, where $\tau^s < \tau_L < \tau_H < \tau^f$. The assumption $\Phi(\mathcal{S})$ is sufficiently high when τ^* approaches τ^f corresponds to $\beta \leq \hat{\beta}$ (and then $\frac{\alpha}{\beta}$ sufficiently high) and $\Phi(\mathcal{S})$ is sufficiently low when τ^* approaches τ^s to $\alpha \leq \hat{\alpha}$. If we exclude an initial taxation $\tau_0 = \tilde{\tau}$[15], where $\tilde{\tau}$ is the unstable stationary state, we can then verify that the dynamics of redistribution is history-dependent if both $\alpha \leq \hat{\alpha}$ and $\beta \leq \hat{\beta}$ (Fig. 3).

As illustrated in Figure 3, if at date $t = 0$ people are socialized in an environment where practices and institutions are close to but sufficiently lower than what is perceived as fair, $\tau_0 = \tau_{H,0} \in (\tilde{\tau}, \tau_H)$, then the level of taxation increases at date $t = 1$, $\tau_1^* > \tau_0$, such that the perceived unfairness of the institutions decreases, $\left[\tau^f - \tau_1^*\right]^2 < \left[\tau^f - \tau_0\right]^2$. The generation that is young at date $t = 1$ is socialized in an environment that is closer to the fair institution than was the previous generation. Hence, by being exposed to less unfairness, their concern for fairness increases and they will support an institution that will be closer to fairness at date $t = 2$. This cultural transmission process ends with the implementation of the high redistribution level characterized by the tax rate τ^{EU}. The redistributive institution and the concern for fairness

[15] If considering that τ_0 is continuously distributed over $[0, 1]$ or $\left[0, \tau^f\right]$, the event $\tau_0 = \tilde{\tau}$ has a probability of zero.

co-evolve and are self-reinforcing such that $\lim_{t\to+\infty} \tau_t^* = \tau^{EU}$ and $\lim_{t\to+\infty} \varphi_{t-1} = \overline{\varphi}$. On the other hand, if the initial taxation is too far from the fair level such that $\tau_0 = \tau_{L,0} \in (\tau_L, \tilde{\tau})$, the process is reversed and the concern for fairness as well as the level of redistribution decrease with time to stabilize towards their low levels $\lim_{t\to+\infty} \tau_t^* = \tau^{US} < \tau^f$ and $\lim_{t\to+\infty} \varphi_{t-1} = \underline{\varphi} < \overline{\varphi}$.

3 Endogenous perceptions, inequality and expectations

3.1 The fair tax rate

Assume for simplicity that the level of taxation considered as fair can now take two values, $\tau_{\text{inf}}^f < \tau_{\text{sup}}^f$. As it has been highlighted in introduction, to characterize the level of redistribution that would be perceived as socially optimal, studies show that individual merit is an important principle at both the individual and aggregate levels. In our framework, as luck is an unfair component of income, $\hat{y}_{it} = A_i \left[\gamma h_{it-1} + (1-\gamma) e_{it}\right]$ measures the deserved or fair income of an individual od type i. Accordingly, the level of private life-cycle utility perceived as fair for an adult at date t is expressed as

$$\hat{u}_{it} = \hat{y}_{it} - \frac{1}{2\beta_i}\left[\gamma h_{it-1}^2 + (1-\gamma) e_{it}^2\right] \tag{16}$$

whereas the effective level, obtained with eqs. (3) and (7), is $u_{it-1} = y_{it}(1-\tau_t) + \tau_t \bar{y}_t - \frac{1}{2\beta_i}\left[\gamma h_{it-1}^2 + (1-\gamma) e_{it}^2\right]$. At the collective level, unfair inequality can be defined as (see Appendix A):

$$I_t = \int_i (u_{it} - \hat{u}_{it})^2 \, di = (1-\tau_t)^2 \sigma_t^2 + \tau_t^2 \left[1 - \gamma \tau_t^e - (1-\gamma)\tau_t\right]^2 \equiv \mathcal{I}(\tau_t, \tau_t^e)$$

Given the two level of taxation τ_{inf}^f and τ_{sup}^f, we define the fair level of taxation as the one which allows for the less unfair inequality:

$$\mathcal{T}^f(\tau_t^e) = \begin{cases} \tau_{\text{inf}}^f & \text{if } \mathcal{I}\left(\tau_{\text{inf}}^f, \tau_t^e\right) < \mathcal{I}\left(\tau_{\text{sup}}^f, \tau_t^e\right) \\ \tau_{\text{sup}}^f & \text{otherwise} \end{cases} \tag{17}$$

If $\sigma_t^2 \to +\infty$, luck explains the overall (pretax) income dispersion, and all inequalities are perceived as unfair. In that case the fair tax rate is always equal to τ_{sup}^f as $\mathcal{I}\left(\tau_{\text{inf}}^f, \tau_t^e\right) > \mathcal{I}\left(\tau_{\text{sup}}^f, \tau_t^e\right)$. Conversely, if $\sigma_t^2 \to 0^+$, luck is insignificant in the determination of income, and the fair taxation establishes at its minimal τ_{inf}^f. Afterwards, it can be shown that if $\gamma \leq \frac{1}{2}$ and $\sigma^2 \geq \frac{1}{2}$, $\mathcal{I}_{\min}(\tau_t^e) = \arg\min_{\tau\in[0,1]} \mathcal{I}(\tau, \tau_t^e) = 1 \ \forall \tau^e$. It follows that $\left(\mathcal{I}_{\min}(\tau_t^e) - \tau_{\text{inf}}^f\right)^2 > \left(\mathcal{I}_{\min}(\tau_t^e) - \tau_{\text{sup}}^f\right)^2$ such that $\mathcal{T}^f(\tau_t^e) = \tau_{\text{sup}}^f \ \forall \tau^e$. This case is similar to the exogenous case studied in the previous section. If $\gamma > \frac{1}{2}$ and $\sigma^2 \geq 2(1-\gamma)^2$, $\tau^e < 2 - \frac{1}{\gamma}$ yields $\mathcal{I}_{\min}(\tau_t^e) < 1$ and $\frac{\partial \mathcal{I}_{\min}}{\partial \tau^e}(\tau^e) > 0$, whereas $\tau^e \geq 2 - \frac{1}{\gamma}$ yields $\mathcal{I}_{\min}(\tau_t^e) = 1$. Accordingly, we can redefine more conveniently, in that case, the perception of the fair tax rate as:

$$\mathcal{T}^f(\tau_t^e) = \begin{cases} \tau_{\inf}^f & \text{if } \tau_t^e < \mathcal{I}_{\min}^{-1}\left(\frac{\tau_{\inf}^f + \tau_{\sup}^f}{2}\right) \\ \tau_{\sup}^f & \text{otherwise} \end{cases} \tag{18}$$

where $\frac{\partial \mathcal{I}_{\min}^{-1}}{\partial \tau_x^f} > 0$, $x = \inf, \sup$, $\frac{\partial \mathcal{I}_{\min}^{-1}}{\partial \sigma^2} < 0$.

As exhibited by eq. (18), expectation in period $t-1$ of the level of taxation in period t plays a crucial role in determining the perception of the fair level of tax rate in period t. As long as $\sigma^2 \geq 2(1-\gamma)^2$ and $\frac{1}{2} < \gamma < 1$, the higher the expected tax rate, the higher the fair-motivated tax rate: $\frac{\partial \mathcal{T}^f}{\partial \tau^e} \geq 0$. By expecting high redistribution, individuals invest less in their human capital as its private return is low. High redistribution discourages the accumulation of human capital. Therefore, the relative importance of luck in market income distribution increases, as well as the moral motivation to compensate for the prevalence of luck through income redistribution. To that extent, the fair taxation goes from $\tau_{\inf}^f$ to $\tau_{\sup}^f$ as the expection τ^e goes above the threshold $\mathcal{I}_{\min}^{-1}\left(\frac{\tau_{\inf}^f + \tau_{\sup}^f}{2}\right)$. By impacting this threshold, the variance σ^2 is equally important to define the perception of the fair level of tax rate. increases. As the variance σ^2 quantify the importance of luck in income determination, its increase reduces the threshold $\mathcal{I}_{\min}^{-1}\left(\frac{\tau_{\inf}^f + \tau_{\sup}^f}{2}\right)$ above which the fair tax rate becomes $\tau_{\sup}^f$ such that $\frac{\partial \mathcal{T}^f}{\partial \sigma^2} \geq 0$. To highlight this significance, we redefine the thresholds $\mathcal{I}_{\min}^{-1}\left(\frac{\tau_{\inf}^f + \tau_{\sup}^f}{2}\right) \equiv \hat{\tau}(\sigma^2)$, where $\hat{\tau}' < 0$ $\left(\sigma^2 \geq 2(1-\gamma)^2 \text{ and } \frac{1}{2} < \gamma < 1\right)$

3.2 Multiplicity of welfare-state regimes

Assuming that $\gamma > \frac{1}{2}$ and $\sigma_t^2 = \sigma^2 \geq 2(1-\gamma)^2$, $\forall t$, the perception of the fair tax rate expresses by eq. (18) implies two configurations given the tax rate in period t. Either $\tau_t < \hat{\tau}(\sigma^2)$ and $\tau_t^f = \tau_{\inf}^f$, or $\tau_t \geq \hat{\tau}(\sigma^2)$ and $\tau_t^f = \tau_{\sup}^f$. In both cases, expectations for the next period can be either such that $\tau_{t+1}^e < \hat{\tau}(\sigma^2)$ and $\tau_{t+1}^f = \tau_{\inf}^f$ or such that $\tau_{t+1}^e \geq \hat{\tau}(\sigma^2)$ and $\tau_{t+1}^f = \tau_{\sup}^f$. Four configurations can then arise. In the first one, $\tau_t < \hat{\tau}(\sigma^2)$ and $\tau_{t+1}^e < \hat{\tau}(\sigma^2)$. In that case, the level of fair taxation is peceived as constant between period t and $t+1$. This is the case studied in the previous section. If $\varphi = \Phi(\mathcal{S})$ is sufficiently high when τ approaches $\tau_{\inf}^f$ and sufficiently low when τ approaches τ^s there exist two stationary states τ_L and τ_I, at least if $\tau_L < \hat{\tau}(\sigma^2)$. Second, if $\tau_t < \hat{\tau}(\sigma^2)$ and $\tau_{t+1}^e < \hat{\tau}(\sigma^2)$, again the level of fair taxation is peceived as constant between period t and $t+1$, but at a higher level. In that case, there is only one

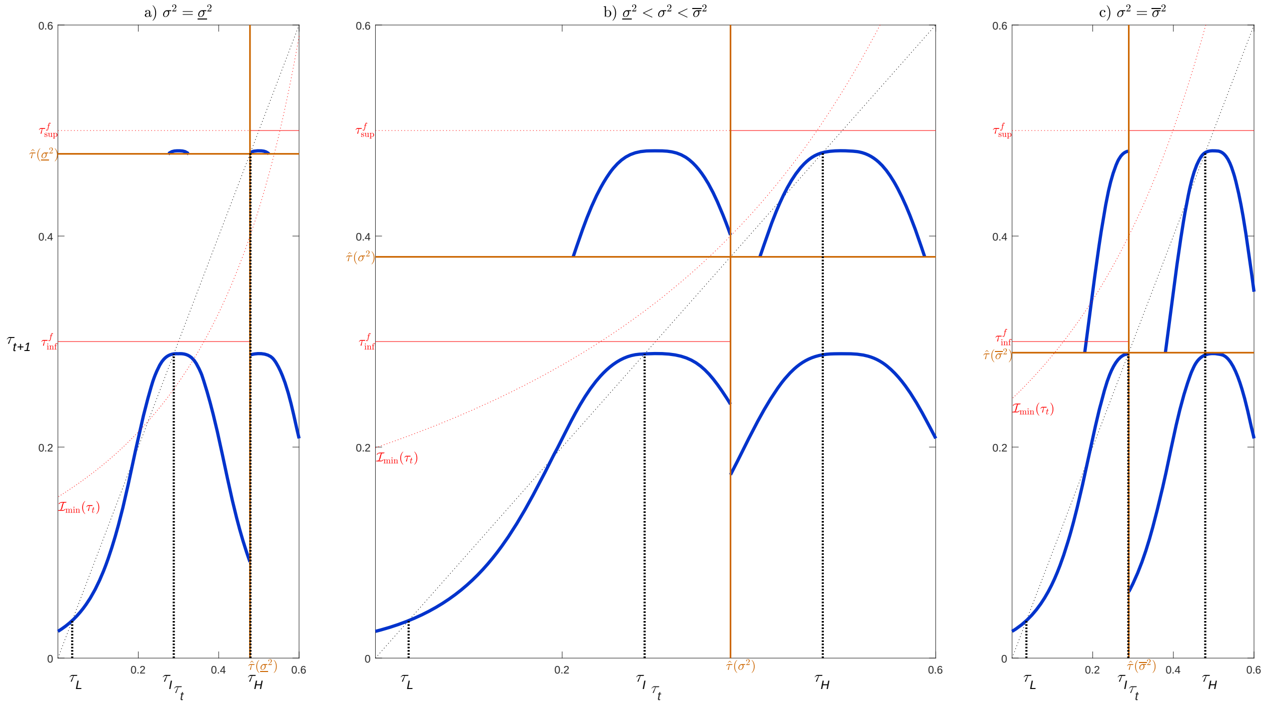

Figure 4: Multiplicity with endogenous perception

potential stationary state τ_H, at least if it is higher or equal to $\hat{\tau}(\sigma^2)$, the one associated with the strong strength of the concern for fairness. Indeed, in that case, it can be shown that the low potential stationary state τ_l, the one associated with the low concern for fairness is such that $\tau_l < \tau_L$ and then that $\tau_l < \hat{\tau}(\sigma^2)$. Stating that $\hat{\tau}' < 0$, it then follows that:

Proposition 1 *If assumptions $H1$ and $H2$ are satisfied, there exist at stationary state thresholds $\underline{\sigma}^2$ and $\overline{\sigma}^2$, $\overline{\sigma}^2 > \underline{\sigma}^2$, such that when $\sigma^2 \in [\underline{\sigma}^2, \overline{\sigma}^2]$, the model exhibits three welfare-state regimes characterized by tax rates $\tau_L < \tau_I < \tau_H$, where $\frac{\partial \tau_L}{\partial \Delta} > 0$, $\frac{\partial \tau_I}{\partial \Delta} \gtrless 0$, $\frac{\partial \tau_H}{\partial \Delta} \gtrless 0$.*

As illustrated in Fig. 4a, when $\sigma^2 = \underline{\sigma}^2$ it follows that $\tau_H = \hat{\tau}(\sigma^2)$. Accordingly, when $\sigma^2 < \underline{\sigma}^2$, knowing that $\hat{\tau}' < 0$, the level of taxation τ_H becomes lower than the thereshold $\hat{\tau}(\sigma^2)$ and the high-redistribution regime does not exist any longer. In the same vein, when $\sigma^2 = \underline{\sigma}^2$, $\tau_I = \hat{\tau}(\sigma^2)$ (Fig. 4c), meaning that when σ^2 is above $\underline{\sigma}^2$, the intermediate welfare-state regime vanishes.

Note that two other configurations that can not contain any stationary state exist: either $\tau_t < \hat{\tau}(\sigma^2)$ and $\tau^e_{t+1} \geq \hat{\tau}(\sigma^2)$, or $\tau_t \geq \hat{\tau}(\sigma^2)$ and $\tau^e_{t+1} < \hat{\tau}(\sigma^2)$. In the first configuration, $\tau^f_t = \tau^f_{\inf}$ and $\tau^f_{t+1} = \tau^f_{\sup}$, while in the second, $\tau^f_t = \tau^f_{\sup}$ and $\tau^f_{t+1} = \tau^f_{\inf}$, avoiding any stationarity (the curve can not cross the main diagonal). As exhibitted in Figure 4, these two configurations question the persistence of the intermediate and the high-redistribution welfare-state regime. While these regimes meet the criteria for a stable stationary state under perfect foresight (local determinacy and local asymptotic stability), meaning that no individual has incentive to modifiate his expectation on his own, they can be destabilized by an ideology—defined, following Bisin and Verdier (2000), as a coordination mechanism for individuals' beliefs. To that extent, from the intermediate regime, a consistent ideology (in the sense of being stable and self-fulfilling) favoring greater redistribution could shift the welfare state toward the high-redistribution regime. This dynamic may help explain why some countries formerly aligned with the intermediate regime have since gravitated closer to the high-redistribution regime. However, while countries in the intermediate regime might move toward the high-redistribution regime, the reverse transition is equally plausible. In the absence of evidence of such a transition in the data, we favor in the next section another explanation linked to the increase in income inequalities characterized by $\sigma_{t+1}^2 > \sigma_t^2$.

3.3 Rising inequality and expectations

Assume there exist initially three welfare-state regimes as sustained by conditions in Proposition 1. If an unexpected, permanent, rise in unfair inequality of income at period 0 (in sub-period 1) such that $\sigma_t^2 = \sigma_0^2 > \sigma_{-1}^2 = \sigma_{-1-t}^2\,(< \overline{\sigma}^2)$ $\forall t \geq 1$. In that case, the fiscal system chosen in sub-period 0 (of period 0) before the shock occurs does not take into account this information: ${}_0\sigma_0^2 = \sigma_{-1}^2$. Two cases arise. Either the shock is sufficiently low such that $\sigma_0^2 < \overline{\sigma}^2$ it has no impact on the three welfare-state regimes. Or the shock is sufficiently large such that $\sigma_0^2 > \overline{\sigma}^2$. In that case, the intermediate level of taxation τ_I does not characterize a welfare-state regime any longer because it has been chosen under the belief that the fair tax rate is stable around $\tau^e = \tau_I$, ${}_0\tau_0^f = \tau_{-1}^f$, whereas it increases, $\tau_0^f > \tau_{-1}^f$. If this last case arises, the young generation raised at period 0 in the intermediate regime observes a disconnection between the existing fiscal system and the one that would be required to fight unfairness. This gap being sufficiently large, it lowers the strength of the concern for fairness of the young generation. The period after, when this generation becomes adult they will vote for less redistribution. The intermediate regime vanishes. With time, the regime evolves and stabilizes when reaching the low-redistribution regime (Fig. 5).

Assume differently that the rise in unfair inequality arises in period 1, is such that $\sigma_1^2 > \overline{\sigma}^2$, and is anticipated in period 0. In that case, by definition the young generation that is educated in the intermediate regime observe no change in the fairness of the fiscal system during their impressionable years and the strength of the concern for fairness stays strong. However, when becoming adult, they know that they will take into account as soon as sub-period 0 the future

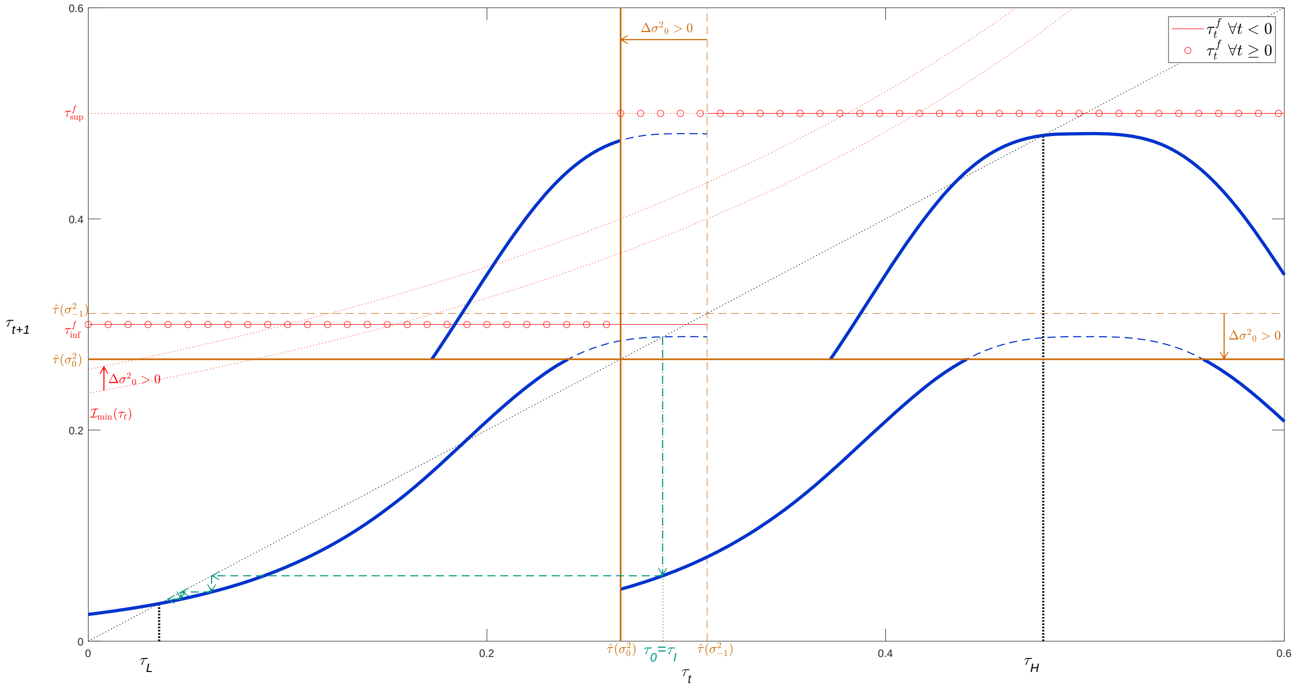

Figure 5: Non-expected inequality shock and the vanishing of the intermediate welfare-state regime

rise in inequality. If this rise is sufficient ($\sigma_1^2 > \overline{\sigma}^2$), it means that they will consider in their choice a rise in the fair tax rate (from τ^f_{inf} to τ^f_{sup}) which leads to an increase in redistribution. This expectation leads the young generation in period 0 to lower their investment in education (eq. 8). The intermediate regime vanishes in period 1, but contrary to the previous case, the tax rate increases in period 1 and will converge over time towards the high-redistribution regime regime (Fig. 6).

Assuming that $\sigma_t^2 = \sigma_{t-1}^2 + \varepsilon_t$, where $\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t$, μ_t being a shock *iid* such that $E_{0,t}\left[\mu_t\right] = 0$, $\rho \in [0, 1)$, it then follows that

Proposition 2 *Assume that income inequality is stationary before period* 0 *such that* $\varepsilon_{-1} = 0$ *and* $\sigma_{-1}^2 \in [\underline{\sigma}^2, \overline{\sigma}^2]$. *An unexpected increase in income inequality characterized by* $\mu_0 > 0$ *leads to the vanishing, everythings else being equal, of the intermediate welfare-state regime if* $\frac{\mu_0}{1-\rho} > \overline{\sigma}^2 - \sigma_{-1}^2$. *More specifically:*

- *if* $\mu_0 > \overline{\sigma}^2 - \sigma_{-1}^2$, *any welfare-state regime characterized by the intermediate regime will converge towards the low-redistribution regime as soon as period* 1,
- *if* $\left(\overline{\sigma}^2 - \sigma_{-1}^2\right)\frac{1-\rho}{1-\rho^{n+1}} < \mu_0 \leq \left(\overline{\sigma}^2 - \sigma_{-1}^2\right)\frac{1-\rho}{1-\rho^n}$, $n \geq 1$, *any welfare-state regime characterized by the intermediate regime is expected in period* 0 *to converge towards the high-redistribution regime beginning in period* n.

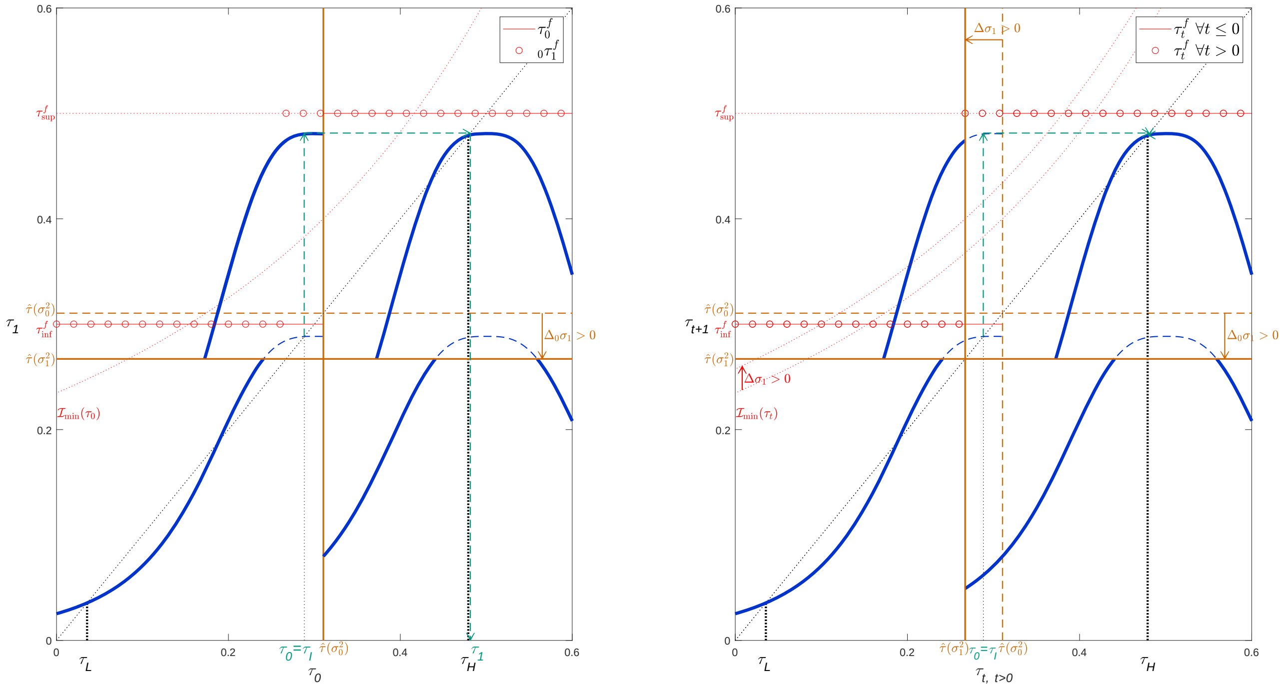

Figure 6: Expected inequality shock and the vanishing of the intermediate welfare-state regime

The fact that most continental european country are now aggregated with is then consistent with the increase in income inequality, as long as the increase is expected. It remains to be seen whether there is reason to believe that the increase in inequality could have been anticipated.

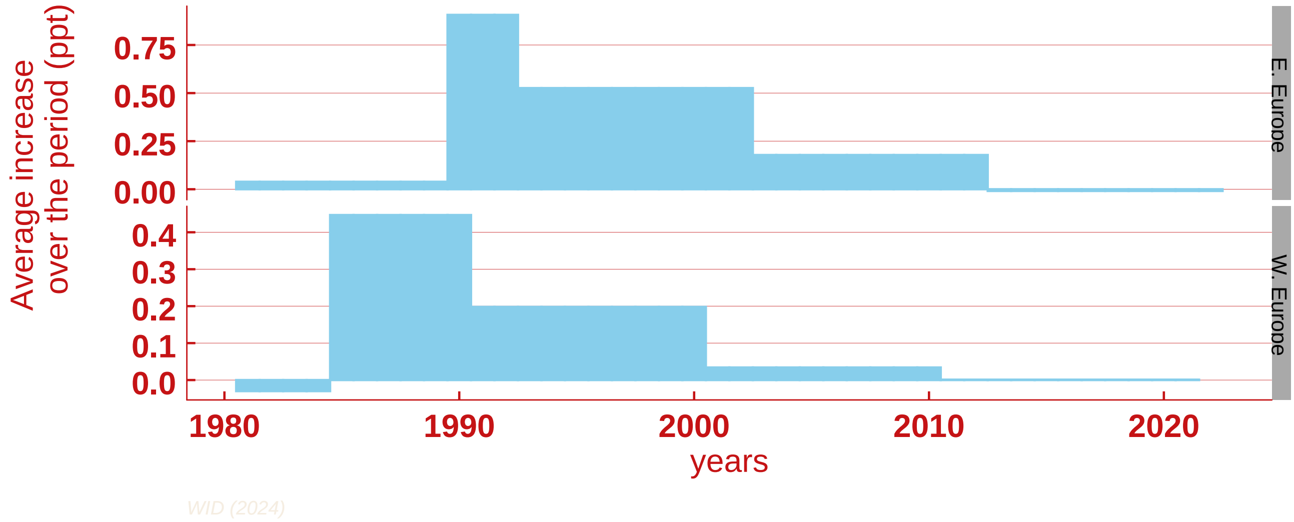

Figure 7: the growth of income inequality by sub-period since 1980

3.4 Discussion

As illustrated in Fig.1, in Western Europe, income inequality rose during the second half of the 1980s, with an average annual increase of more than 0.4 percentage points. In the following decades, this annual rise slowed to an average of 0.2 percentage points, then to around 0.05, before stabilizing after 2010. As illustrated in Fig. 7, this pattern is roughly consistent with the process $\sigma_t^2 = \sigma_{t-1}^2 + \varepsilon_t$, where $\varepsilon_t = \rho\varepsilon_{t-1} + \mu_t$, μ_t being a shock *iid* such that $E_{0,t}[\mu_t] = 0$, $\rho \in [0, 1)$, which can be rewriten as $\Delta\sigma_t^2 = \rho\Delta\sigma_{t-1}^2 + \mu_t$. In this framework, the initial rise in inequality was unexpected but was followed by a more predictable increase. The pressure on Bismarckian welfare states translated into greater redistribution, characterized by a shift from financing through social payroll taxes to general taxation to reinforce universal income protection (see. Hemerijck and Eichhorst, 2010).

When examined at the country level, the pattern observed in Western Europe is broadly reflected in France. However, smaller countries such as Austria and Belgium saw no significant increase in inequality, as measured by the share of the top 10%. Nevertheless, in these smaller countries, the broader European environment may have shaped public perceptions. Even if inequality did not increase, these perceptions alone may have been enough to undermine the Bismarckian welfare-state model, as illustrated in Fig. 6. By contrast, in Spain, the stability of income inequality may explain why its welfare state remained classified as Bismarckian in 2019.

Finally, what about the former communist countries of Eastern Europe? The unexpected shock of the fall of the Berlin Wall in 1989 was significant. Although our model does not account for the functioning of these countries before this event, it is generally assumed that their welfare states followed a Bismarckian approach (see Hemerijck and Eichhorst, 2010). Today, the structure of their welfare states appears to have been maintained, though the timing of the shock was later than in Western Europe.

4 Conclusion

After Esping-Andersen's seminal study in 1990, welfare states have conventionally been clustered into three distinct regimes. In the liberal welfare regime, characteristic of Anglo-Saxon countries, support is primarily targeted at the poor, and flat-rate benefits are low. In contrast, in the social-democratic welfare regime, exemplified by Nordic countries, benefits are universal (available to all citizens) and generous. Finally, in the corporatist welfare regime, typical of Continental Europe, benefits are also substantial but linked to contributions, resulting in lower income redistribution compared to the social-democratic regime but higher than in the liberal one. A recent study by Péligry and Ragot (2024) has found that most European continental countries are currently grouped with Nordic countries in the high-taxation category. This finding challenges the long-term stability of the canonical clustering and suggests that welfare states can evolve and change over time. To address this issue, we have developed an overlapping generations model that combines the fairness approach of Alesina and Angeletos (2005) with the mechanism for the cultural transmission of moral norms proposed by Le Garrec (2018). By incorporating these two components into the demand for redistribution, we identify a welfare-state clustering à la Esping-Andersen (1990), where each regime is likened to a stable stationary state. We then show that rising inequality can drive convergence from an intermediate to a high-redistribution regime, but only if the increase is anticipated. If not, inequality may push the intermediate regime towards a low-redistribution regime, highlighting a disconnect between the current tax system and the one required for fair redistribution.

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Appendix A

As luck is an unfair component of income, $\hat{y}_{it} = A_i \left[\gamma h_{it-1} + (1-\gamma) e_{it}\right]$ measures the deserved or fair income of an individual od type i. Accordingly, the level of private life-cycle utility perceived as fair for an adult at date t is expressed as

By definition, $\tau_t^f = \arg\min_{\tau} \int_i (u_{it} - \hat{u}_{it})^2 \, di$.

When considering eqs. (3), (7), (8), (9) and (10), utility writes as:

$$\begin{aligned} u_{it} &= (a_i \left[1 - \gamma\tau_t^e - (1-\gamma)\tau_t\right] + \varepsilon_{it})(1-\tau_t) + \tau_t \bar{a} \left[1 - \gamma\tau_t^e - (1-\gamma)\tau_t\right] \\ &- \frac{a_i}{2}\left[\gamma(1-\tau_t^e)^2 + (1-\gamma)(1-\tau_t)^2\right] \end{aligned} \tag{19}$$

As luck is an unfair component of income, $\hat{y}_{it} = A_i \left[\gamma h_{it-1} + (1-\gamma) e_{it}\right]$ measures the deserved or fair income of an individual od type i. Accordingly, the level of private life-cycle utility perceived as fair for an adult at date t is $\hat{u}_{it} = \hat{y}_{it} - \frac{1}{2\beta_i}\left[\gamma h_{it-1}^2 + (1-\gamma) e_{it}^2\right]$. It follows from eq. (8) and (9) that:

$$\hat{u}_{it} = a_i \left[1 - \gamma\tau_t^e - (1-\gamma)\tau_t\right] - \frac{a_i}{2}\left[\gamma(1-\tau_t^e)^2 + (1-\gamma)(1-\tau_t)^2\right] \tag{20}$$

Therefore, from eqs (19) and (20) it yields $u_{it} - \hat{u}_{it} = (1-\tau_t)\varepsilon_{it} - \tau_t\left[1 - \gamma\tau_t^e - (1-\gamma)\tau_t\right](a_i - \bar{a})$, and as luck ε and personal talent a are independently distributed, it follows:

$$I_t = \int_i (u_{it} - \hat{u}_{it})^2 \, di = (1-\tau_t)^2 \sigma_t^2 + \tau_t^2 \left[1 - \gamma\tau_t^e - (1-\gamma)\tau_t\right]^2 \sigma_a^2 \equiv \mathcal{I}(\tau_t, \tau_t^e)$$

where we normalize σ_a^2 to unity.

We then define

$$\mathcal{T}^f(\tau_t^e) = \begin{cases} \tau_{\inf}^f & \text{if } \mathcal{I}\left(\tau_{\inf}^f, \tau_t^e\right) < \mathcal{I}\left(\tau_{\sup}^f, \tau_t^e\right) \\ \tau_{\sup}^f & \text{otherwise} \end{cases}$$

Define then $\mathcal{I}_{\min}(\tau_t^e) \equiv \arg\min_{\tau} \mathcal{I}(\tau_t, \tau_t^e)$ and assume there is a unique interior solution belonging to interval $[0,1]$. In that case, it follows that, $|\tau_t - \mathcal{I}_{\min}(\tau_t^e)|$ being sufficiently small:

$$\mathcal{I}(\tau_t, \tau_t^e) \approx \mathcal{I}(\mathcal{I}_{\min}(\tau_t^e), \tau_t^e) + (\tau_t - \mathcal{I}_{\min}(\tau_t^e)) \frac{\partial \mathcal{I}}{\partial \tau_t}(\mathcal{I}_{\min}(\tau_t^e)) + \frac{(\tau_t - \mathcal{I}_{\min}(\tau_t^e))^2}{2} \frac{\partial^2 \mathcal{I}}{\partial \tau_t^2}(\mathcal{I}_{\min}(\tau_t^e))$$

where $\frac{\partial \mathcal{I}}{\partial \tau_t}(\mathcal{I}_{\min}(\tau_t^e)) = 0$ (FOC) and $\frac{\partial^2 \mathcal{I}}{\partial \tau_t^2}(\mathcal{I}_{\min}(\tau_t^e)) > 0$ (SOC). Accordingly the perception of the fair tax rate can be rewrite as $\mathcal{T}^f(\tau_t^e) = \begin{cases} \tau_{\inf}^f & \text{if } \left(\mathcal{I}_{\min}(\tau_t^e) - \tau_{\inf}^f\right)^2 < \left(\mathcal{I}_{\min}(\tau_t^e) - \tau_{\sup}^f\right)^2 \\ \tau_{\sup}^f & \text{otherwise} \end{cases}$

or equivalently

$$\mathcal{T}^f\left(\tau_t^e\right) = \begin{cases} \tau_{\text{inf}}^f & \text{if } \mathcal{I}_{\min}\left(\tau_t^e\right) < \frac{\tau_{\text{inf}}^f + \tau_{\text{sup}}^f}{2} \\ \tau_{\text{sup}}^f & \text{otherwise} \end{cases}$$

As is obvious, $\lim\limits_{\sigma_t^2 \to 0^+} \mathcal{I}_{\min}\left(\tau_t^e\right) = 0$ (if $\tau^e < 1$) and $\lim\limits_{\sigma_t^2 \to +\infty} \mathcal{I}_{\min}\left(\tau^e\right) = 1$. The first order condition $\frac{\partial\left\{(1-\tau)^2\sigma_t^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau} = 0$ rewrites as:

$$-\left(1-\tau\right)\sigma^2 + \tau\left[1-\gamma\tau^e-\left(1-\gamma\right)\tau\right]^2 - \left(1-\gamma\right)\tau^2\left[1-\gamma\tau^e-\left(1-\gamma\right)\tau\right] = 0 \qquad (21)$$

The second order condition is then $\frac{\partial^2\left\{(1-\tau)^2\sigma^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau^2} > 0$, or equivalently:

$$\sigma^2 + 6\left(1-\gamma\right)^2\tau^2 - 6\left(1-\gamma\right)\left(1-\gamma\tau^e\right)\tau + \left(1-\gamma\tau^e\right)^2 > 0 \qquad (22)$$

Differentiating eq. (21) leads to
$\frac{\partial^2\left\{(1-\tau)^2\sigma^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau^2} d\mathcal{I}_{\min} + \frac{\partial^2\left\{(1-\tau)^2\sigma^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau\partial\tau^e} d\tau^e = 0$
where $\frac{\partial^2\left\{(1-\tau)^2\sigma_\varepsilon^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau\partial\tau^e} = \gamma\tau\left[3\left(1-\gamma\right)\tau - 2\left(1-\gamma\tau^e\right)\right]$. With condition (22), it follows that:

$$\frac{d\mathcal{I}_{\min}}{d\tau^e} \geq 0 \Leftrightarrow \tau \leq \frac{2\left(1-\gamma\tau^e\right)}{3\left(1-\gamma\right)}$$

Considering the first order condition (21), if $\tau^e = 2 - \frac{1}{\gamma}$ or $\tau^e = 1$ it yields $\mathcal{I}_{\min}\left(\tau^e\right) = 1$, where $\frac{d\mathcal{I}_{\min}}{d\tau^e}\Big|_{\mathcal{I}_{\min}=\tau^e=1} = -\frac{\gamma(1-\gamma)}{\sigma^2+(1-\gamma)^2} \leq 0$ and $\frac{d\mathcal{I}_{\min}}{d\tau^e}\Big|_{\mathcal{I}_{\min}=1,\tau^e=2-\frac{1}{\gamma}} = \frac{\gamma(1-\gamma)}{\sigma^2-2(1-\gamma)^2} \geq 0$.

Considering then the second order condition (22), it yields that
$\frac{\partial^2\left\{(1-\tau)^2\sigma^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau^2}\Bigg|_{\mathcal{I}_{\min}=1,\tau^e=2-\frac{1}{\gamma}} > 0$ is equivalent to

$$\sigma^2 > 2\left(1-\gamma\right)^2$$

where $\frac{\partial \left.\frac{\partial^2\left\{(1-\tau)^2\sigma^2+\tau^2[1-\gamma\tau^e-(1-\gamma)\tau]^2\right\}}{\partial\tau^2}\right|_{\tau=1}}{\partial\tau^e} = 6\gamma\left(1-\gamma\right)\left[1-\frac{1}{3}\frac{1-\gamma\tau^e}{1-\gamma}\right] \geq 0 \ \forall\tau^e \geq 2-\frac{1}{\gamma}$.

If $\gamma \leq \frac{1}{2}$ and $\sigma^2 \geq \frac{1}{2}$, we deduce that $\mathcal{I}_{\min}\left(\tau_t^e\right) \geq 1 \ \forall\tau^e$. It follows that $\left(\mathcal{I}_{\min}\left(\tau_t^e\right) - \tau_{\text{inf}}^f\right)^2 > \left(\mathcal{I}_{\min}\left(\tau_t^e\right) - \tau_{\text{sup}}^f\right)^2$ such that $\mathcal{T}^f\left(\tau_t^e\right) = \tau_{\text{sup}}^f \ \forall\tau^e$. This case is similar to the exogenous case studied in the previous section.

if $\gamma > \frac{1}{2}$ and $\sigma^2 \geq 2\left(1-\gamma\right)^2$, $\tau^e < 2-\frac{1}{\gamma}$ yields $\mathcal{I}_{\min}\left(\tau_t^e\right) < 1$ and $\frac{\partial\mathcal{I}_{\min}}{\partial\tau^e}\left(\tau^e\right) > 0$, whereas $\tau^e \geq 2-\frac{1}{\gamma}$ yields $\mathcal{I}_{\min}\left(\tau_t^e\right) = 1$. Therefore, if an expectation $\hat{\tau}_t^e$ is such that $\mathcal{I}_{\min}\left(\hat{\tau}_t^e\right) = \frac{\tau_{\text{inf}}^f+\tau_{\text{sup}}^f}{2} < 1$, it yields that $\hat{\tau}_t^e = \mathcal{I}_{\min}^{-1}\left(\frac{\tau_{\text{inf}}^f+\tau_{\text{sup}}^f}{2}\right) < 2-\frac{1}{\gamma}$. Accordingly, we can redefine, in that case, the perception of the fair tax rate as:

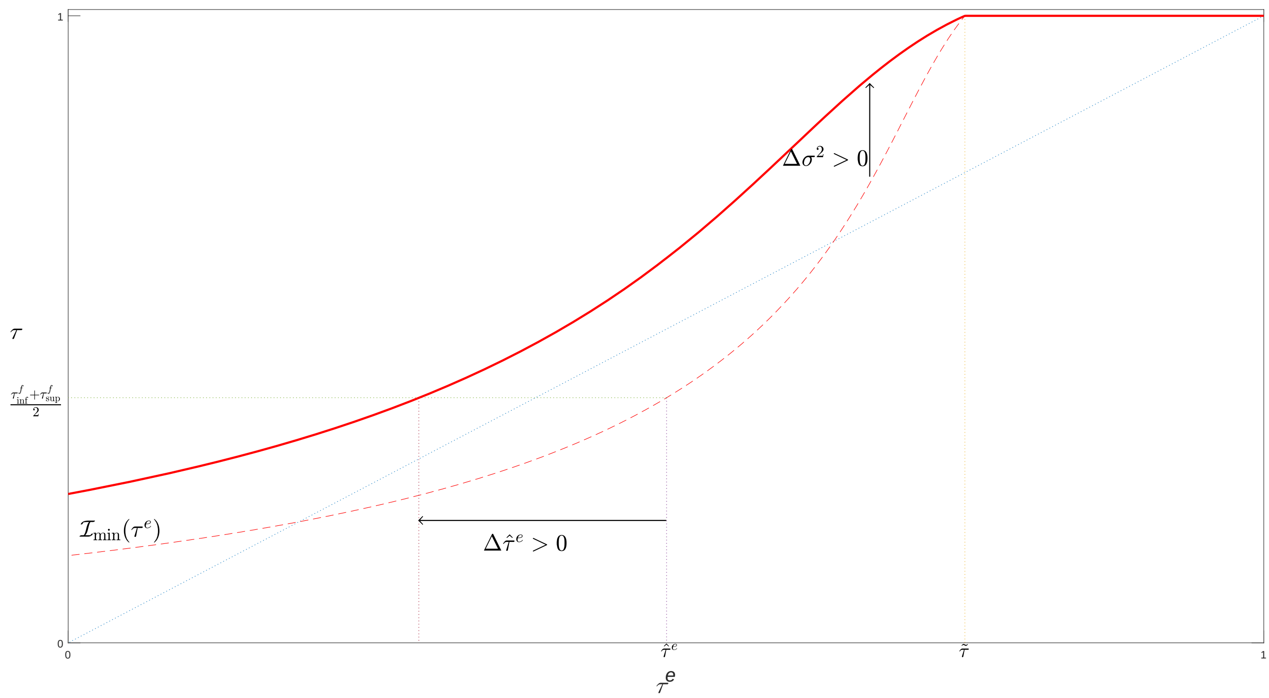

Figure 8: $\frac{\partial \hat{\tau}^e}{\partial \sigma^2} < 0$ when $\gamma > \frac{1}{2}$ and $\sigma^2 \geq 2\left(1-\gamma\right)^2$

$$\mathcal{T}^f\left(\tau^e_t\right) = \begin{cases} \tau^f_{\text{inf}} & \text{if } \tau^e_t < \mathcal{I}^{-1}_{\min}\left(\frac{\tau^f_{\text{inf}}+\tau^f_{\text{sup}}}{2}\right) \\ \tau^f_{\text{sup}} & \text{otherwise} \end{cases}$$

where $\frac{\partial \mathcal{I}^{-1}_{\min}}{\partial \tau^f_x} > 0$, $x = \text{inf}, \text{sup}$, $\frac{\partial \mathcal{I}^{-1}_{\min}\left(\frac{\tau^f_{\text{inf}}+\tau^f_{\text{sup}}}{2}\right)}{\partial \sigma^2} = \frac{\partial \hat{\tau}^e}{\partial \sigma^2} < 0$ (see Fig. 8).