2011- 24 / December 2011

Document de travail

REDISTRIBUTION AND THE CULTURAL TRANSMISSION OF THE TASTE FOR FAIRNESS

Gilles Le Garrec
OFCE

Redistribution and the cultural transmission of the taste for fairness

Gilles Le Garrec

OFCE

gilles.legarrec@ofce.sciences-po.fr

Abstract

Departing from mainstream economics, surveys first show that individuals do care about fairness in their demand for redistribution. They also show that the cultural environment in which individuals grow up affects their preferences about redistribution. Including these two components of the demand for redistribution, we propose in this article a mechanism of cultural transmission of the taste for fairness. Consistently with the process of socialization, the young preferences depend on collective choices through observation and imitation. Observation during childhood of redistributive policies far from what is perceived as fair results then in a lower taste for fairness. As a consequence, the model exhibits a multiplicity of history-dependent steady states which may account for the huge difference of redistribution observed between Europe and the United States.

Keywords: redistribution, voting behavior, fairness, endogenous preferences

JEL: H53, D72, D64

1 Introduction

In mainstream economics individuals are supposed to be driven only by their self-interest. As a consequence, when studying the redistributive phenomenon in democracy, the first challenge for most economists is to explain why there is so little redistribution in democracy. Indeed, considering that the idea of democracy is captured by the majority rule, as the median citizen is characterized by an income lower than the average, a majority should support a complete income redistribution to satisfy their self-interest. As a canonical answer to this issue, Meltzer and Richard (1981) have shown that selfish people have no interest to support a overly high redistribution, even if they are poorer than average, because of a tax disincentive effect that lowers productivity. Their model also implies that we should observe a positive correlation between redistribution and income inequality. However, such a correlation is weakly supported by data. While redistribution is significantly higher and more progressive in (continental) Europe than in the United States, their pre-tax income inequality appear similar (see Table 1). By contrast, Perotti (1996), Moene and Wallerstein (2001), de Mello and Tiongson (2006) and Iversen and Soskice (2006) support that the empirical relationship between income inequality and redistribution is the opposite of the predicted one or is insignificant.

Countries	Pre-tax income inequality (GINI)	Public Social Spendings (% GDP)	Progressivity Index
Sweden	0.37	19.8	1.77
France	0.41	18.3	1.73
Germany	0.43	15.5	1.95
UK	0.41	15.2	1.12
US	0.43	10.6	1.31

Table 1. Income inequality (working age population) and social spending (except Old Age) in 2005 (source: OECD and author's calculation; the progressivity index gives the decrease in percent of income inequality allowed by a social spending of 1% of GDP).

In order to improve the canonical model's predictions, different dimensions have been investigated[1]. From a behavioral perspective, the postulate that individuals are driven only by their self-interest has been challenged when studying redistribution (Piketty, 1995, Alesina and Angeletos, 2005, Lind, 2007). It has been challenged firstly because an impressive number of experimental studies have pointed out that individuals do not behave selfishly in the way supposed in mainstream economics (see Batson, 1991, Fehr and Schmidt, 2006). It has also been challenged because analysis of survey data clearly show that people do care about fairness in their demand for redistribution (Fong, 2001, Corneo and Grüner, 2002, Alesina and La Ferrara, 2005, Corneo and Fong, 2008, Alesina and Giuliano, 2010). In line with such findings, Alesina, Glaeser and Sacerdote (2001) therefore show that beliefs according to which *luck rather than effort determines income*[2] are strong

[1] Economic (Bénabou, 2000), political (Roemer 1998, Rodriguez, 2004, Iversen and Soskice, 2006, Petrova, 2008, Campante, 2010) and behavioral (Bénabou and Ok, 2001, Bénabou and Tirole, 2006); see Alesina and Angeletos (2004), Lind (2005) and Campante (2010) for overviews.

[2] From World Values Survey data, they highlight that 54% of Europeans versus 30% of

predictors, unlike income inequality, of the national level of redistribution. As a matter of fact, fairness has a major influence in shaping redistributive politics.

If voters care only about the welfare of the population when considering redistribution, Piketty (1995) showed that international differences in the level of redistribution (when countries share identical economic fundamentals) can be explained by different beliefs about social mobility sustained by an imperfect learning process. Close to the concept of reciprocal altruism, Lind (2007) considers that voters care about their self-interest, and the welfare of the members of their own group, more than the rest of the population. In such a context, he shows that both fractionalization and group antagonism reduce redistribution. In the spirit of Gilens (1999), he then supports that the difference of redistribution between Europe and the United States is sustained by a difference in ethnic fractionalization. In Alesina and Angeletos (2005), voters also care about both their self-interest and fairness. In their model, fairness is not defined according to a utilitarian social welfare as in Piketty (1995) and Lind (2007), but according to a deontological principle (*everyone should receive what he deserves*) whose relevance is empirically supported in psychology and sociology when considering income distribution (see Schokkaert, 1998, Forsé and Parodi, 2006). With income depending on both effort and luck, they show that cultural variability of the level of redistribution arises as a multiplicity of equilibria resulting from different self-fulfilled beliefs. By expecting low redistribution, Americans invest in their human capital and generate conditions for low redistribution by reducing the importance of luck in the income determination. Conversely, by expecting a high redistribution, Europeans invest less in their human capital and will support a high redistribution later.

Considering Piketty (1995) and Alesina and Angeletos (2005), Luttmer

Americans believe that *luck rather than effort determines income.*

and Singhal (2011) have however expressed reservations about the capacity of such beliefs to persist over long periods of time and across generations. They argue indeed that different beliefs can be sustained over long periods only if they are embedded in culture. More generally, their empirical findings, along with those of Guiso et al. (2006), Alesina and Fuchs-Schündeln (2007) and Alesina and Giuliano (2010), support that cultural and political environment in which individuals grow up affects their preferences and beliefs concerning redistribution. On this basis, Bisin and Verdier (2004) analysed the dynamics of redistribution through a model of cultural transmission of the taste for leisure. Through socialization, they stress that taste is shaped by observation, imitation and internalization of cultural practices. In the same line, we propose in this article a model of cultural transmission of the taste for fairness. Consistently with the process of socialization, observation during childhood of redistributive policies far from what is perceived as fair results in a lower taste for fairness. Considering that social spendings is one of the key tool fighting social exclusion, this mechanism appears consistent with experiments showing that social exclusion results in a substantial reduction in prosocial behavior (Tracy et al., 2007). Based on this mechanism, our model then exhibits a multiplicity of history-dependent steady states which may account for the huge difference of redistribution observed between Europe and the United States.

The rest of the paper is organized as follows. In section 2, we present the model of cultural transmission and we specify the mechanism explaining the sustained and significant difference of redistribution observed between Europe and the United States. In section 3, we then reexamine the impact of inequality on the level of redistribution. In section 4, we generalize the multiplicity of steady states found in previous sections by considering family background and the intergenerational transmission of inequality. We conclude briefly in the last section.

2 The model

The economy is populated by a continuum of individuals whose actions take place according to the timeline in Figure 1. Each individual lives for two periods: childhood and adulthood. When adults, they work in order to maximize their welfare and the consumption of their household. They also vote over income redistribution. When children, they are educated and socialized, and by this process they internalize the cultural practices which will influence their behavior when they become adults. Indeed, as noted in Alesina and Giuliano (2010), social psychologists[3] argue that the cultural environment during youth can leave a permanent mark on individuals, while after reaching adulthood they are resistant to change. To assess the cultural component of human behavior, some studies have pointed out the significant and persistent difference between immigrant and native behaviors such as on fertility choices and women's labor supply (Fernández and Fogli, 2006), on savings (Carroll et al., 1994), on trust (Algan and Cahuc, 2010) or on preferences for redistribution (Luttmer and Singhal, 2011, Alesina and Giuliano, 2010). Others have used different history individuals have experienced as natural experiments (the German reunification for Alesina and Fuchs-Schündeln, 2007; the Great Depression for Malmendier and Nagel, 2011).

Following Piketty (1995), Alesina and Angeletos (2005) and Bénabou and Tirole (2006), we assume that income y_{it} of an adult at date t is determined conjointly by luck and by effort such as:

$$y_{it} = e_{it} + \varepsilon_i \tag{1}$$

where e_{it} denotes effort and ε_i luck (or bad luck), unknown before the income distribution and such as $E_0\left[\varepsilon_i\right] = 0$ (see Fig. 1).

[3]See Roberts and DelVecchio (2000) for an overview.

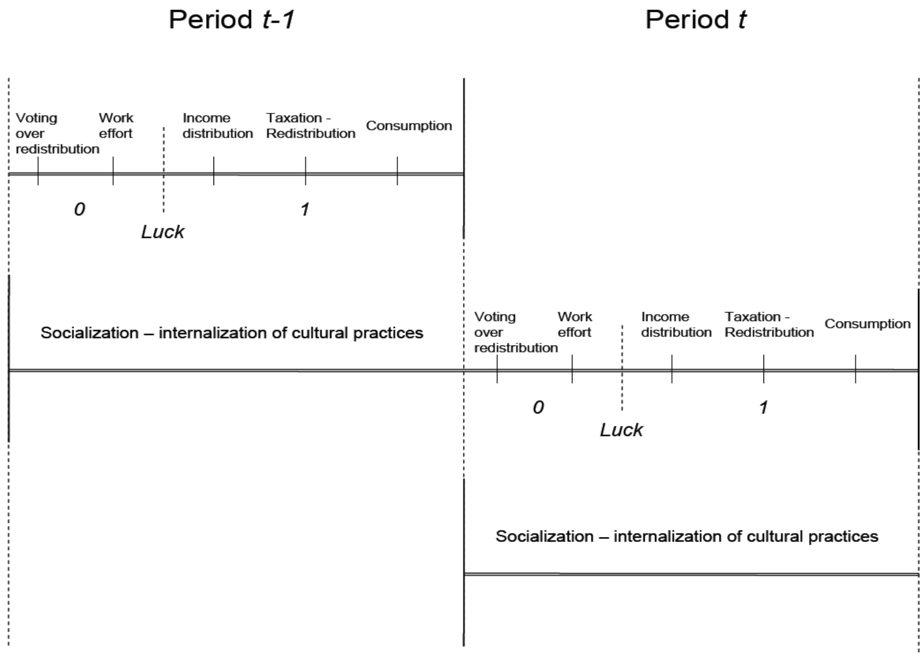

Figure 1: Timing of actions

At each period t, income redistribution is characterized by a taxation rate τ_t and a flat-rate benefit g_t. Assuming a balanced budget, it follows that $g_t = \tau_t \bar{y}_t$, where $\bar{y}_t$ is the mean income in t. Considering then an extended version of the Bolton-Ockenfels model (2000) of distributive preferences with costly effort, we specify the utility function as follows:

$$U_{it} = y_{it}\left(1-\tau_t\right) + \tau_t \bar{y}_t - \frac{e_{it}^2}{2a_i} - \frac{\varphi_{t-1}}{2}\left(\tau^f - \tau_t\right)^2 \tag{2}$$

where $a_i \geq 0$ denotes the taste for effort, distributed independently from luck, $\varphi_{t-1} \geq 0$ the taste for fairness, and τ^f the level of redistribution perceived as fair[4]. Note that in the standard version of the Bolton-Ockenfels model, with no effort, the fair level of redistribution would be characterized

[4] In Le Garrec (2009), such preferences for fairness has been interpreted as guilt aversion whose importance in shaping individual behaviors has been experimentally shown by Charness and Dufwenberg (2006) in the trust game.

by $\tau^f = 1$, i.e. equality of income.

The optimal effort resulting from the maximization of the expected utility $E_0[U_{it}]$ is then:

$$e_{it} = a_i (1 - \tau_t) \tag{3}$$

As redistribution lowers the market return to effort, it reduces the effort. In addition, as the taste for effort lowers the utility cost of effort, it enhances the effort. Considering eq. (3), the pre-tax income (1) of an adult in t can be rewritten as:

$$y_{it} = a_i (1 - \tau_t) + \varepsilon_i \tag{4}$$

As the level of effort is reduced by redistribution, obviously the pre-tax income is also reduced. As a consequence, redistribution reduces not only the variance of the disposable income, but also the variance of the pre-tax income.

Considering eq. (4), maximizing utility (2) with respect to the taxation rate results in the following individual demands for redistribution in t:

$$\tau_{it} = \begin{cases} \frac{\bar{a} - a_i + \varphi_{t-1}\tau^f}{2\bar{a} - a_i + \varphi_{t-1}} & \text{if } a_i \leq \bar{a} + \varphi_{t-1}\tau^f \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

Individual demands for redistribution as specified in eq. (5) decrease with personal income and increase with the level of redistribution perceived as fair. Eq. (5) is then consistent with empirical surveys (Fong, 2001, Corneo and Grüner, 2002, Alesina and La Ferrara, 2005, Corneo and Fong, 2008, Alesina and Giuliano, 2010). In addition, at least if $\tau^f \geq \frac{1}{2}$, eq. (5) is also consistent with findings from Luttmer and Singhal (2011) and Alesina and Giuliano (2010) which stress that culture and socialization when young determine the demand for redistribution. They indeed show that immigrants from high mean-preference redistribution countries continue to support higher redistribution in their destination country. From eq. (5), the mean-preference redistribution is characterized by $\frac{\Phi_{t-1}\tau^f}{\bar{a}+\Phi_{t-1}}$. If the fair level of redistribution reflects objective features in the economy such as the importance of luck in the income determination (Alesina and Angeletos, 2005), the cultural component in the demand for redistribution corresponds in our setting to the taste for fairness φ_{t-1}. Assume then that this taste is shaped by internalization of cultural practices during childhood through the process of socialization. First, through voting collective choices depend on adult preferences. The young preferences depend then on collective choices through observation and imitation. Consistently with the process of socialization, we assume then that observation during childhood of redistributive policies far from what is perceived as fair results in a lower taste for fairness: $\frac{\partial \varphi_{t-1}}{\partial \left|\tau^f - \tau_{t-1}\right|} < 0$. In order to get analytical results, we specify φ_{t-1} as follows:

$$\varphi_{t-1} = \frac{1}{\varphi_0 + \varphi_1 \left[\tau^f - \tau_{t-1}\right]^2}, \ \varphi_0 \geq 0, \ \varphi_1 > 0 \qquad (6)$$

Note that, contrary to Bisin and Verdier (2001, 2004), the cultural transmision mechanism we underline occurs through observation and imitation of society at large, not within family. Note also that considering social spendings as one of the key tool fighting social exclusion, this mechanism appears consistent with experiments showing that social exclusion results in a substantial reduction in prosocial behavior (Tracy et al., 2007).

Knowing that τ_{it} as defined by eq. (5) is a decreasing function of a_i, assuming standardingly that the distribution of a is skewed to the right, i.e. $a_{med} \leq \bar{a}$, entails that the tax rate chosen under the majority rule is specified as:

$$\tau_t = \frac{\bar{a} - a_{med} + \varphi_{t-1}\tau^f}{2\bar{a} - a_{med} + \varphi_{t-1}} \qquad (7)$$

Let $\tau^s = \frac{\bar{a}-a_{med}}{2\bar{a}-a_{med}}$ be the taxation rate chosen under the majority rule if individuals were driven only by their self-interest, i.e. if $\varphi_{t-1} = 0$, we can rewrite (7) as:

$$\tau_t = \xi_{t-1}\tau^s + \left(1 - \xi_{t-1}\right)\tau^f \tag{8}$$

where

$$\xi_{t-1} = \frac{2\bar{a} - a_{med}}{2\bar{a} - a_{med} + \varphi_{t-1}} \tag{9}$$

Any taxation rate chosen under the majority rule is then expressed as a convex combination of the purely interested and the purely fair taxation rates.

Proposition 1 *Assume that* $\tau^f - \tau^s \geq \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$*, it exists* $\hat{\varphi}_0 \geq 0$ *so that if* $\varphi_0 \leq \hat{\varphi}_0$ *the model exhibits two steady states characterized by* $\tau^s < \tau^{US} < \tau^{EU} \leq \tau^f$ *(see Fig 2).*

According to Proposition 1, if $\tau^f - \tau^s \geq \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$ and $\varphi_0 \leq \hat{\varphi}_0$ the dynamics of redistribution is then history dependent. Consider for example the case where $\varphi_0 = 0$. Considering the tax sequence $\{\tau_t\}_{t=0}^{t=\infty}$ and assuming that $\tau^f - \tau^s \geq \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$, if $\tau_0 \in \left]\tau^f - \delta; \tau^f + \delta\right[$, where $\delta = \frac{\tau^f - \tau^s - \sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{4}{(2\bar{a}-a_{med})\varphi_1}}}{2}$, then $\lim\limits_{t\to\infty} \tau_t = \tau^f$, otherwise $\lim\limits_{t\to\infty} \tau_t = \frac{1}{2}\left(\tau^f + \tau^s - \sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{4}{(2\bar{a}-a_{med})\varphi_1}}\right)$. If the initial level of taxation corresponds to an institution lower but sufficiently close to the fair level, the taste for fairness transmitted to the young generation increases. When they become adult the next period, the latter will then support a redistribution level closer to the fair level. This cultural transmission process ends with the implementation of high level of redistribution, close to the level perceived as fair, as the taste for fairness becomes significantly large. By contrast, if people are initially socialized in an environment whose practices and institutions are far from reflecting fairness, internalization of the observed norm *you should behave according to your own interest* reduces the concern for

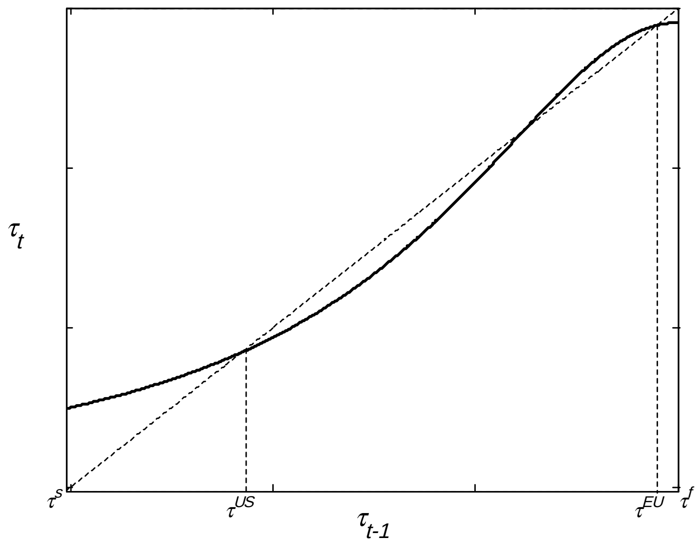

Figure 2: Multiplicity and history dependancy of redistribution when $\tau^f - \tau^s > \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$ and $0 < \varphi_0 < \tilde{\varphi}_0$.

fairness. The process will end with a low redistribution level, though higher than the selfish one, as the taste for fairness converges towards a low level. Note that if $\varphi_0 > \hat{\varphi}_0$, whatever the level of taxation and its distance with the fair level, the taste for fairness is always low enough so that the only steady state corresponds to a low income redistribution. By contrast, if φ_1 is low enough so that $\tau^f - \tau^s < \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$, any level of taxation corresponds to a sufficiently fair level so that the only steady state reflects a high income redistribution.

3 Motivation and the impact of inequality on redistribution

According to the multiplicity of steady states highlighted in Proposition 1, a negative correlation between income inequality and redistribution appears supported, at least if comparing European countries and the United States. Indeed, with a higher taxation, Europeans are supposed to make less effort than Americans. Therefore, their difference between mean and median income is lower. However, from a dynamic perspective, the Meltzer-Richard effect is still observed. Consider indeed an inequality shock characterized by $d\Delta > 0$. By increasing the difference between mean and median income, the purely selfish taxation rate τ^s increases which results in the increase of the effective taxation rate both in European countries and in the United States. However, it is important to note that this result holds by assuming that the inequality shock $d\Delta$ has no impact on the tax rate perceived as fair, while there are good reasons to think it has. Assume in particular that distributive justice is characterized by the principle *each person should receive what he deserves*[5], where the deserved or fair income is defined by:

$$\hat{y}_{it} = e_{it} \tag{10}$$

i.e. the income only related to effort. Following Alesina and Angeletos (2005), we then specify the engine of fairness perception by:

$$F_t = \int_i \left\{ \left[(1 - \tau_t)\, y_{it} + \tau_t \bar{y}_t \right] - \hat{y}_{it} \right\}^2 di \tag{11}$$

where the taxation rate perceived as fair corresponds to the minimization of F_t: $\tau_t^f = \arg\min F_t$. As a and ε are independently distributed, eq. (4) allows us to rewrite eq. (11) as (see Appendix B):

$$\frac{F_t}{\sigma_a^2} = (1 - \tau_t)^2 \left(L + \tau_t^2 \right) \tag{12}$$

[5] Forsé et Parodi (2006) show that European countries share an identical hierarchy of moral principles: first the guarantee of basic needs, second fairness (merit), and far less important equality of income. If we admit that basic needs are mostly satisfied in Europe and in the United States, fairness is the relevant concept to analyse marginal variations of the redistribution levels. In addition, Schokkaert (1998) argues that fairness is the dominant criteria when considering social relationship at an aggregate level.

where $L = \frac{\sigma_\varepsilon^2}{\sigma_a^2}$, σ_ε^2 denotes the variance of ε which represents the importance of luck in the income determination (one can think of for example a uniform distribution where $\varepsilon_{\max} = \pm l$, and then where $\sigma_\varepsilon^2 = \frac{l^2}{3}$) and σ_a^2 denotes the variance of a. L represents therefore the relative importance of luck in the income determination. As obvious, the fair tax rate resulting from minimization of (12) is $\tau^f = 1$. At first glance, this result tends to confirm that inequality shocks $d\Delta$ have no impact on the tax rate perceived as fair. Nevertheless, it raises two issues which cast doubt on the relevance of such a result. First, being equal to one, such fair level of taxation implies that the high level of taxation supposed to reflect the European system is unrealistically close to one. Second, this result is closely related to the standard assumption in economics that individuals respond only to external rewards. As a consequence, if income is not related to effort, no effort is made. By contrast, psychologists (see Ryan and Deci, 2000; Gneezy and Rustichini, 2000; Frey and Jegen, 2001; Bénabou and Tirole, 2002) stress the importance of intrinsic motivation in making an effort, where intrinsic motivation represents incentives unrelated (or eventually negatively related) to external rewards such as income or status. To adress these two points, assume that effort is specified as:

$$e_{it} = e_{it}^{im} + e_{it}^{em} \tag{13}$$

where e_{it}^{im} and e_{it}^{em} are respectively the intrinsically and extrinsically motivated efforts. Intrinsic motivation exists directly between a person and an activity. On one hand, an effort can be said intrinsically motivated if related to an interesting activity. On the other hand, an effort can be said intrinsically motivated if it satisfies any innate psychological need or taste. In both cases, the reward is the effort itself. In this view, let us consider that the taste for effort reflects the psychological need underlying the intrinsically motivated effort so that $e_{it}^{im} = a_i$. Assuming then that only the extrinsically effort entails a disutility cost as in (2), it follows that $e_{it}^{em} = a_i(1-\tau_t)$, and accordingly:

$$y_{it} = a_i(2-\tau_t) + \varepsilon_i \tag{14}$$

With intrinsic motivation, individuals still continue to make different levels of effort even if the level of taxation is equal to one. It follows that $\frac{F_t}{\sigma_a^2} = (1-\tau_t)^2 L + \tau_t^2(2-\tau_t)^2$ whose minimization results in (see Appendix B):

$$\tau_t^f = \tau^f = \begin{cases} 1-\sqrt{1-\frac{L}{2}} & \text{if } L \leq 2 \\ 1 & \text{otherwise} \end{cases} \tag{15}$$

As defined by eq. (15), the tax rate perceived as fair then increases with the relative importance of luck in the income determination: $\frac{\partial \tau^f}{\partial L} \geq 0$. As the relative importance of luck is defined by $L = \frac{\sigma_\varepsilon^2}{\sigma_a^2}$, it also means that an increase of the variance of a reduces the relative luck and then $\frac{\partial \tau^f}{\partial \sigma_a^2} \leq 0$. If income was determined only by luck, eq. (15) would imply that $\tau^f = 1$, as in the standard version of the Bolton-Ockenfels model. In addition, admit that an increase of the variance of a is correlated with an increase between mean and median income characterized by $\Delta = \bar{a} - a_{med}$ as in standard statistical distributions. For example, assume that a is distributed according to a Log-normal of parameters $\mu = 0$ and σ. It follows that $\sigma_a^2 = \left(e^{\sigma^2}-1\right)e^{\sigma^2}$ and $\Delta = e^{\frac{\sigma^2}{2}} - 1$. In this case $L = \frac{\sigma_\varepsilon^2}{\Delta(2+\Delta)(1+\Delta)^2}$ and any increase of the difference between mean and median income is associated with a lower relative importance of luck in the income determination and then with a lower fair level of redistribution. In this configuration, except that $\tau^s = \frac{2(\bar{a}-a_{med})}{2\bar{a}-a_{med}}$, Proposition 1 stays unchanged and it follows that:

Proposition 2 *Assuming* $\tau^f - \tau^s \geq \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$ *and* $L < 2$, $\varphi_0 \approx 0$ *and* $\varepsilon_{\tau^s}^{\Delta} \geq \frac{\tau^f-\tau^s}{\tau^f+\tau^s}$ *are sufficient conditions so that* $\frac{d\tau^{EU}}{d\Delta} < 0$ *and* $\frac{d\tau^{US}}{d\Delta} > 0$.

In the European style system, $\varphi_0 \approx 0$ entails $\tau^{EU} \approx \tau^f$. As long as $L < 2$, any increase of the difference between mean and median incomes Δ can be associated straightfowardly with a decrease of the relative importance of luck in the wage determination L which tends to reduce the level of redistribution: $\frac{d\tau^{EU}}{d\Delta} < 0$. By contrast, in the American style system, as an increase of Δ is also associated with a higher selfish level of redistribution, $\frac{d\tau^{s}}{d\Delta} > 0$, the outcome is not straightforward. However, as sustained in Proposition 2, under an unrestrictive condition, the American style system exhibits a size increased with the difference between mean and median income as in the Meltzer-Richard model (1981). This result first emphasizes the difficulty in investigating the empirical relationship between redistribution and income inequality. From a dynamic perspective, it also strongly suggests that Europe and the United States should be dissociated in this task. For example, while most cross-country studies (e.g. Perotti, 1996, Moene and Wallerstein, 2001, de Mello and Tiongson, 2006, Iversen and Soskice, 2006) found a negative or insignificant relation between redistribution and income inequality, Meltzer and Richard (1983) found a positive relation when considering only the United States from a time-series perspective.

4 Family background and the inheritance of inequality

So far, we have pointed out, following empirical studies, that if luck is important in the income determination, individual demands for redistribution are stronger. More generally, what is stressed in the surveys to characterize the perceived unfairness of the income distribution and then the individual demands for redistribution are factors beyond one's control (e.g. Fong, 2001, Alesina and La Ferrara, 2005, Fong et al., 2006, Corneo and Fong, 2008). Along with luck, there is then also family background. Thereafter, one can argue that luck as modelized in eq. (1) is an oversimplification of all the factors beyond one's control. Indeed, as pointed out by Bowles and Gintis

(2002) and d'Addio (2007), earnings are very significantly tied to the parents' earnings[6]. When considering the income determination characterized by eq. (1), such a correlation can be obtained by assuming that psychological and cognitive skills are genetic inherited traits. However, by showing that the inherited genetic component of IQ is very weak, Bowles and Gintis (2002; see also Bisin and Topa, 2003) weaken the basis of such an assumption. By contrast, it strengthens the idea that family background is an important factor in the income determination which can not be captured by idiosyncratic shocks. In this line, Bourdieu (1984) asserts in particular that cultural consumption is of crucial importance when explaining the capacity of high-income earners to ensure the reproduction of income inequality. On one hand, by consuming cultural goods, high-income earners shape wealthier class cultural norms which exclude others. On the other hand, by their cultural practices, they also develop networking activities. Income, cultural capital and social capital are closely related.

On a family cultural basis of factors beyond one's control, in contrast with eq. (1), let us consider that income of an adult in t is characterized by:

$$y_{ij,t} = c_{j,t-1} + e_{it} \tag{16}$$

where $c_{j,t-1}$ denotes parents' cultural consumption in $t-1$. Considering the different types of consumption goods, we redefine the utility function as:

[6] As noted in Bowles and Gintis (2002), a widely held consensus among American economists used to be that "Low earnings as well as high earnings are not strongly transmitted from father to sons" (Becker, 1988). However, following Solon (1992) the low correlations between fathers' and sons' incomes previously estimated in America were due to measurement errors. With improved methodology and data, Björklund and Jäntti (1997) even show that the intergenerational income mobility in Sweden is higher (however not significantly) than in the United States.

$$U_{ij,t} = \frac{1}{\psi^{\psi}(1-\psi)^{1-\psi}} c_{i,t}^{\psi} d_{i,t}^{1-\psi} - \frac{\left(e_{i,t}^{em}\right)^2}{2a_i} - \frac{\Phi_{t-1}}{2}\left(\tau_t^f - \tau_t\right)^2 \tag{17}$$

where $d_{i,t}$ denotes the standard final consumption and $\psi \in [0,1]$ represents the importance of cultural goods in consumption. Assuming for simplicity a transformation technology from one standard good to one cultural good, it entails that both forms of consumption which maximize (17) are characterized by:

$$c_{i,t} = \psi\left[(1-\tau_t)\, y_{ij,t} + \tau_t \bar{y}_t\right] \tag{18}$$

$$d_{i,t} = (1-\psi)\left[(1-\tau_t)\, y_{ij,t} + \tau_t \bar{y}_t\right] \tag{19}$$

When introducing the optimal behaviors (18) and (19) into the utility function (17), the latter becomes $U_{ij,t} = y_{ij,t}(1-\tau_t) + \tau_t \bar{y}_t - \frac{\left(e_{i,t}^{em}\right)^2}{2a_i}$. In this configuration, the utility maximization considering (16) leads to an unchanged level of extrinsically motivated effort compared to the previous sections, and it follows that $e_{it} = a_i(2-\tau_t)$.

Consider now that the concept of fair income is associated with the principle of *equal opportunities* between individuals. In this case we can redefine the fair level of income as:

$$\hat{y}_{ij,t} = \bar{c}_{t-1} + e_{i,t} \tag{20}$$

where $\bar{c}_{t-1}$ is the average cultural consumption. In line with Bowles and Gintis (2002), we assume that personal cognitive skills characterized by a_i are not heritable genetic traits. It entails in particular that the parental cultural consumption $c_{j,t-1}$ of an individual ij is not correlated with his cognitive skills a_i. The fair level of taxation stays then similar to (15), i.e. $\tau_t^f = 1 - \sqrt{1 - \frac{L_t}{2}}$ if $L_t \leq 2$ (= 1 otherwise), except that:

$$L_t = \frac{\sigma^2_{c_{t-1}}}{\sigma^2_a} \tag{21}$$

where $\sigma^2_{c_{t-1}}$ is the variance of parents' cultural consumption in $t-1$. Individual demands for redistribution are then as follows:

$$\tau_{ij,t} = \xi_{t-1}\tau^s_{ij,t} + \left(1-\xi_{t-1}\right)\tau^f_t \tag{22}$$

where $\tau^s_{ij,t} = \frac{2(\bar{a}-a_i)+(\bar{\pi}_{t-1}-\pi_{j,t-1})}{2\bar{a}-a_{med}}$, and $\xi_{t-1} = \frac{2\bar{a}-a_{med}}{2\bar{a}-a_{med}+\frac{1}{\varphi_0+\varphi_1\left[\tau^f_{t-1}-\tau_{t-1}\right]^2}}$. Compared with eq. (5), eq. (22) still stresses that individual demands for redistribution depend on the income inequality, the perceived unfairness of the income distribution and the specific history of the society. In addition, it stresses the importance of the family background: everything else being equal, an individual raised in a wealthy family (with high cultural standards) tends to support less redistribution. Following eq. (22), the tax rate chosen under the majority rule is then:

$$\tau_t = \xi_{t-1}\tau^s_t + \left(1-\xi_{t-1}\right)\tau^f_t \tag{23}$$

where $\tau^s_t = \frac{2(\bar{a}-a_{med})+\left(\bar{\pi}_{t-1}-\pi_{med,t-1}\right)}{2\bar{a}-a_{med}}$.

Consider an institutional stationary history so that $\tau_k = \tau_{-1}, \forall k \leq t-1$. In this case we have (see Appendix C):

$$\tau^s_t = \Gamma^s\left(\tau_{-1}\right) \tag{24}$$

$$\tau^f_t = \Gamma^f\left(\tau_{-1}\right) \tag{25}$$

where $\Gamma^s\left(\tau_{-1}\right) = \frac{\left[2+\frac{\psi(1-\tau_{-1})(2-\tau_{-1})}{1-\psi(1-\tau_{-1})}\right](\bar{a}-a_{med})}{2\bar{a}-a_{med}}$ and $\Gamma^f\left(\tau_{-1}\right) = 1-\sqrt{1-\frac{\psi^2(1-\tau_{-1})^2(2-\tau_{-1})^2}{2\left[1-\psi^2(1-\tau_{-1})^2\right]}}$. From (24) and (25) we can define a purely fair and a purely interested tax rates corresponding respectively to $\tau^f = \Gamma^f\left(\tau^f\right)$ and $\tau^s = \Gamma^s\left(\tau^s\right)$. It results two continuous and monotonic functions $\tau^f\left(\psi\right)$ and $\tau^s\left(\psi, \Delta\right)$ so that

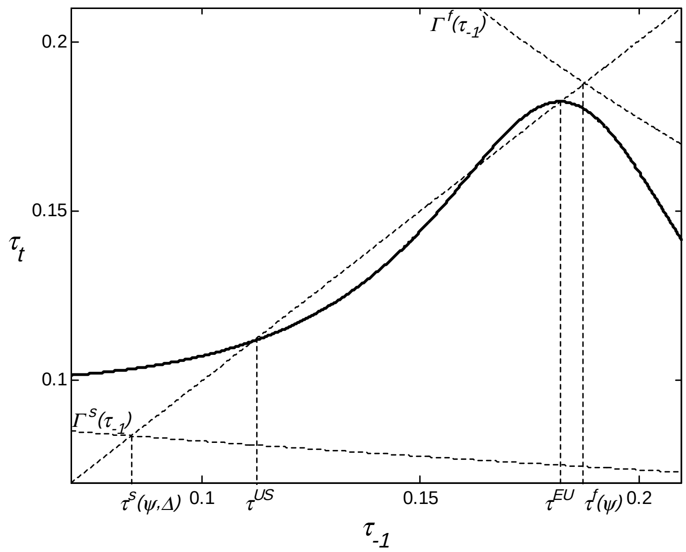

Figure 3: Multiple steady states and family background ($ln\,(a) \sim \mathcal{N}\,(0, 0.217)$, $\psi = 0.5$, $\varphi_0 = 0.07$, $\varphi_1 = 200$)

$\frac{d\tau^f}{d\psi} \geq 0$, where $\tau^f\,(0) = 0$ and $\tau^f\,(1) = \sqrt{2} - 1 \approx 0.41$, $\frac{\partial \tau^s}{\partial \psi} \geq 0$ and $\frac{\partial \tau^s}{\partial \Delta} \geq 0$, where $\tau^s\,(0, \Delta) = \Gamma^s\,(1) = \frac{2(\bar{a} - a_{med})}{2\bar{a} - a_{med}}$ and $\tau^s\,(\psi, 0) = 0$.

Proposition 3 *Considering a stationnary tax history* $\{\tau_k = \tau_{-1}\}_{k=-\infty}^{k=t-1}$*, it exists* $\tilde{\varphi}_0 \geq 0$ *and* $\tilde{\psi} \approx 0.55$ *so that if* $\varphi_0 \leq \tilde{\varphi}_0$ *and* $\psi \leq \tilde{\psi}$*,* $\tau^f\,(\psi) - \tau^s\,(\psi, \Delta) \geq \sqrt{\frac{4}{(2\bar{a} - a_{med})\varphi_1}}$ *is a sufficient condition so that the model exhibits two local steady states characterized by* $\tau^s\,(\psi, \Delta) < \tau^{US} < \tau^{EU} \leq \tau^f\,(\psi)$*, where* $\tau^f\,(\psi) \equiv \tau = \Gamma^f\,(\tau)$ *and* $\tau^s\,(\psi, \Delta) \equiv \tau = \Gamma^s\,(\tau)$ *(see Fig 3).*

The mechanism of cultural transmission we have characterized in the second section is then robust to different specifications of income determination in exhibiting a multiplicity of steady states. As explained in the second section, if φ_0 is too high the only steady state is a low redistribution American-style system. By contrast, if φ_1 is low enough, the only steady state is a high redistribution European-style system. In addition, as the engine of unfairness in this configuration is the cultural consumption, unfairness is all the more important as ψ is high. The sensitivity of the tax rate percieved as fair with respect to the effective tax rate is then increased with ψ, and if $\psi > \tilde{\psi}$ it follows that $\left|\frac{\partial \Gamma^f}{\partial \tau_{-1}}\right|_{\tau_{-1}=\tau^f(\psi)} > 1$. As $\tau^{EU} \approx \tau^f(\psi)$ if $\varphi_0 \approx 0$, it follows that if $\psi > \tilde{\psi}$ the high redistribution European-style system may not be a steady state.

5 Conclusion

Under the assumption that humans are only driven by their self-interest, Meltzer and Richard (1981) show that the level of redistribution in a democratic society increases with the inequality in the income distribution. However, this result is weakly supported by the data. In this article, we argue that this failure of the canonical model can be associated with its behavioral assumption. Firstly, surveys clearly show that individuals do care about fairness in their demand for redistribution. Secondly, they show that the cultural environment in which individuals grow up affects their preferences about redistribution. In order to characterize the individual demands for redistribution, we then propose a mechanism of cultural transmission of the taste for fairness. Consistently with the process of socialization, the young preferences depend on collective choices through observation and imitation. Observation during childhood of redistributive policies far from what is perceived as fair results then in a lower taste for fairness. As a consequence, we show that the model exhibits a multiplicity of history-dependent steady states which may account for the huge difference of redistribution observed between Europe and the United States.

The approach we use in this article raises two issues which can lead to further research. First, we have not considered individual heterogeneity in the taste for fairness. However, following Alesina and Giuliano (2010), it appears that more educated individuals are less supportive of redistribution.

Second, we have assumed that all individuals were sharing the same ideal of fairness. Most individuals certainly perceive earnings related to effort as fair and earnings related to luck as unfair. However, as experimentally shown by Cappelen et al. (2007), a significant proportion of individuals argue that individuals should not be held responsible for their effort and talent. These individuals consider then equal sharing as the fair outcome.

References

[1] Alesina A., Glaeser E. and Sacerdote B. (2001), Why doesn't the US have a European-style welfare system?, *Brookings Papers on Economic Activity*, 2, pp. 187-277.

[2] Alesina A. and Glaeser E. (2004), *Fighting poverty in the US and Europe: A world of difference*, Oxford University Press.

[3] Alesina A. and Angeletos G.-M. (2005), Fairness and redistribution: US versus Europe, *American Economic Review,* 95(4), pp. 960-980.

[4] Alesina A. and La Ferrara E. (2005), Preferences for redistribution in the land of opportunities, *Journal of Public Economics*, 89(5-6), pp. 897-931.

[5] Alesina A. and Fuchs-Schündeln N. (2007), Good bye Lenin (or not?): the effect of communism on people's preferences, *American Economic Review*, 97(4), pp. 1507-1528.

[6] Alesina A. and Giuliano P. (2010), Preferences for redistribution, forthcoming in A. Bisin and J. Benhabib eds. *Handbook of Social Economics*, North Holland Amsterdam.

[7] Algan Y. and Cahuc P. (2010), Inherited trust and growth, *American Economic Review*, 100(5), pp. 2060-2092.

[8] Batson C. D. (1991), *The altruism question: toward a social psychological answer*, Hillsdale, NJ: Lawrence Erlbaum.

[9] Becker G. (1988), Family economics and macro behavior, *American Economic Review*, 78(1), pp. 1-13.

[10] Bénabou R. (2000), Unequal societies: income distribution and the social contract, *American Economic Review*, 90(1), pp. 96-129.

[11] Bénabou R. and Ok E. (2001), Social mobility and the demand for redistribution: the POUM hypothesis, *Quarterly Journal of Economics*, 116(2), pp. 447-487.

[12] Bénabou R. and Tirole J. (2003), Intrinsic and extrinsic motivations, *Review of Economic Studies*, 70, pp. 489-520.

[13] Bénabou R. and Tirole J. (2006), Belief in a just world and redistributive politics, *Quarterly Journal of Economics*, 121(2), pp. 699-746.

[14] Bisin A. and Topa G. (2003), Empirical models of cultural transmission, *Journal of the European Economic Association*, 1(2-3), pp. 363-375.

[15] Bisin A. and Verdier T. (2001), The economics of cultural transmission and the dynamics of preferences, *Journal of Economic Theory*, 97, pp. 298-319.

[16] Bisin A. and Verdier T. (2004), Work ethic and redistribution: a cultural transmission model of the Welfare State, Unpublished Manuscript, New York University.

[17] Björklund A. and Jäntti M. (1997), Intergenerational income mobility in Sweden compared to the United States, *American Economic Review*, 87(5), pp. 1009-1018.

[18] Bolton G. and Ockenfels A. (2000), ERC: A theory of equity, reciprocity, and competition, *American Economic Review*, 90(1), pp. 166-193.

[19] Bourdieu P. (1984), *Distinction: A social critique of the judgement of taste*, London: Routledge & Kegan Paul.

[20] Bowles S. and Gintis H. (2002), The inheritance of inequality, *Journal of Economic Perspective*, 16(3), pp. 3-30.

[21] Campante F. (2010), Redistribution in a model of voting and campaign contributions, *Journal of Public Economics*, forthcoming.

[22] Carroll C., Rhee B.-K. and Rhee C. (1994), Are there cultural effects on saving? Some cross-sectional evidence, *Quarterly Journal of Economics*, 109(3), pp. 685-699.

[23] Charness G. and Dufwenberg M. (2006), Promises and partnership, *Econometrica*, 74(6) , pp. 1579–1601.

[24] Corneo G. and Grüner H.-P.(2002), Individual preferences for political redistribution, *Journal of Public Economics*, 83, pp. 83-107.

[25] Corneo G. and Fong C. (2008), What's the monetary value of distributive justice?, *Journal of Public Economics*, 92(1), pp. 289-308.

[26] de Mello L. et Tiongson E. (2006), Income inequality and redistributive government spending, *Public Finance Review*, 34(3), pp. 282-305.

[27] Fehr E. and Schmidt K. (2006), The economics of fairness, reciprocity and altruism: experimental evidence and New Theories, in S.-C. Kolm and J. Mercier Ythier (Eds), *Handbook of the economics of giving, altruism and reciprocity, vol. 1*, North Holland/Elsevier, chap. 8.

[28] Fernández R. and Fogli A. (2006), Fertility: the role of culture and family experience, *Journal of the European Economic Association*, 4(2–3) pp. 552–561.

[29] Fong C. (2001), Social preferences, self-interest, and the demand for redistribution, *Journal of Public Economics*, 82(2), pp. 225-246.

[30] Fong C., Bowles S. and Gintis H. (2006), Strong Reciprocity and the Welfare State, in S.-C. Kolm and J. Mercier Ythier (Eds), *Handbook of the economics of giving, altruism and reciprocity, vol. 2*, North Holland/Elsevier, chap. 23.

[31] Forsé M. and Parodi M. (2006), Justice distributive: la hiérachie des principes selon les européens, *Revue de l'OFCE*, 98, pp. 213-244.

[32] Frey B. S. and Jegen R. (2001), Motivation crowding theory, *Journal of Economic Surveys*, 15(5), pp. 589–611.

[33] Gilens M. (1999), *Why Americans hate welfare*, University of Chicago Press, Chicago.

[34] Gneezy U. and Rustichini A. (2000), Pay enough, or don't pay at all, *Quarterly Journal of Economics*, 115, pp. 791–810.

[35] Guiso L., Sapienza P. and Zingales L. (2006), Does culture affect economic outcomes?, *Journal of Economic Perspectives*, 20(2), pp. 23-48.

[36] Iversen T. and Soskice D. (2006), Electoral institutions and the politics of coalitions: why some democracies redistribute more than others, *American Political Science Review*, 100(2), pp. 165-181.

[37] Le Garrec G. (2009), Guilt aversion and redistributive politics: a moral intuitionist approach, *OFCE WP* n°2009-22.

[38] Lerner M. (1982), *The Belief in a Just World: a fundamental delusion*, New York, NY: Plenum Press.

[39] Lind J. T. (2005), Why is there so little redistribution?, *Nordic Journal of Political Economy*, 31, pp. 111-125.

[40] Lind J. T. (2007), Fractionalization and the size of government, *Journal of Public Economics*, 91(1-2), pp. 51-76.

[41] Luttmer E. and Singhal M. (2011), Culture, context, and the taste for redistribution, *American Economic Journal: Economic Policy*, 3(1), pp. 157-179.

[42] Malmendier U. and Nagel S. (2011), Depression babies: do macroeconomic experience affect risk taking?, *Quarterly Journal of Economics*, 126, pp. 373-416.

[43] Meltzer A. and Richard S. (1981), A rational theory of the size of government, *Journal of Political Economy*, 89(5), pp 914-927.

[44] Meltzer A. and Richard S. (1983), Tests of a rational theory of the size of government, *Public Choice*, 41, pp. 403–418.

[45] Moene K. O. et Wallerstein (2001), Inequality, social insurance and redistribution, *American Political Science Review*, 95(4), pp. 859-874.

[46] Perotti R. (1996), Growth, income distribution and democracy: what the data say, *Journal of Economic Growth*, 1(2), pp. 149–187.

[47] Petrova M. (2008), Inequality and Media Capture, *Journal of Public Economics*, 92(1-2), pp. 183-212.

[48] Piketty T. (1995), Social mobility and redistributive politics, *Quarterly Journal of Economics*, 110(3), pp. 551-584.

[49] Roberts B. and DelVecchio W. (2000), The rank-order consistency of personality traits from childhood to old age: a quantitative review of longitudinal studies, *Psychological Bulletin*, 126(1), pp. 3-25.

[50] Rodriguez F. (2004), Inequality, redistribution and rent-seeking, *Economics & Politics*, 16, pp. 287-320.

[51] Ryan R. and Deci E. (2000), Intrinsic and extrinsic motivations: classic definitions and new directions, *Contemporary Educational Psychology*, 25, pp. 54-67.

[52] Schokkaert E. (1998), Mr. Fairmind is post-welfarist: opinions on distributive justice, *Center for Economic Studies DPS 98.09*, Catholic University of Leuven.

[53] Solon G. (1992), Intergenerational income mobility in the United States, *American Economic Review*, 82(3), pp. 393-408.

[54] Roemer J. (1998), Why do the poor do not expropriate the rich: an old argument in new garb, *Journal of Public Economics*, 70, pp. 399-424.

[55] Twenge J., Baumeister R., DeWall N., Ciarocco N. and Bartels M. (2007), Social exclusion decreases prosocial behavior, *Journal of Personality and Social Psychology*, 92(1), pp. 56-66.

Appendix A. Proof of Propositions

Proposition 1

Let us define $\delta_t = \tau^f - \tau_t$ the difference between the fair and the effective level of taxation at date t, eq. (8) can be rewritten as:

$$\delta_t = \frac{2\bar{a} - a_{med}}{2\bar{a} - a_{med} + \frac{1}{\varphi_0 + \varphi_1 \delta_{t-1}^2}} \left(\tau^f - \tau^s\right) \tag{26}$$

and stationnarity is then defined by:

$$\delta^3 - \left(\tau^f - \tau^s\right)\delta^2 + \frac{1 + (2\bar{a} - a_{med})\,\varphi_0}{(2\bar{a} - a_{med})\,\varphi_1}\delta - \left(\tau^f - \tau^s\right)\frac{\varphi_0}{\varphi_1} = 0 \tag{27}$$

By the Cardano's formula, eq. (27) exhibits two or three real roots if $\Delta \leq 0$, where:

$$\begin{aligned} \Delta \quad = \quad & \frac{-1}{27}\left(\frac{1 + (2\bar{a} - a_{med})\,\varphi_0}{(2\bar{a} - a_{med})\,\varphi_1}\right)^2 \left[\left(\tau^f - \tau^s\right)^2 - 4\frac{1 + (2\bar{a} - a_{med})\,\varphi_0}{(2\bar{a} - a_{med})\,\varphi_1}\right] \\ & + \frac{\left(\tau^f - \tau^s\right)^2}{27}\frac{\varphi_0}{\varphi_1}\left[4\left(\tau^f - \tau^s\right)^2 - \frac{18 - 9\,(2\bar{a} - a_{med})\,\varphi_0}{(2\bar{a} - a_{med})\,\varphi_1}\right] \end{aligned}$$

If assuming $\left(\tau^f - \tau^s\right)^2 - \frac{4}{(2\bar{a} - a_{med})\varphi_1} \geq 0$, as $\lim_{\varphi_0 = 0} \Delta \leq 0$ and $\lim_{\varphi_0 = \infty} \Delta > 0$, it exists $\hat{\varphi}_0 \geq 0$ so that if $\varphi_0 \leq \hat{\varphi}_0$ eq. (27) exhibits two or three real roots.

In addition, as $\frac{2\bar{a} - a_{med}}{2\bar{a} - a_{med} + \frac{1}{\varphi_0}}\left(\tau^f - \tau^s\right) \geq 0$ and $\frac{\partial\left[\frac{2\bar{a} - a_{med}}{2\bar{a} - a_{med} + \frac{1}{\varphi_0 + \varphi_1 \delta^2}}\left(\tau^f - \tau^s\right)\right]}{\partial \delta^2} \geq 0$, if $\left(\tau^f - \tau^s\right)^2 - \frac{4}{(2\bar{a} - a_{med})\varphi_1} \geq 0$ and $\varphi_0 \leq \hat{\varphi}_0$, the model exhibits two steady states.

Proposition 2

As far as $\tau^f - \tau^s \geq 2\sqrt{\frac{\Phi}{2\bar{a} - a_{med}}}$, the American style system is characterized by the following payroll tax:

$$\tau^{US} = \frac{1}{2}\left(\tau^f + \tau^s - \sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{2\Phi\tau^s}{\Delta}}\right)$$

We have then:

$$\begin{aligned}\frac{\partial \tau^{US}}{\partial \Delta} &= \frac{1}{2}\left(\frac{\partial \tau^f}{\partial \Delta} + \frac{\partial \tau^s}{\partial \Delta} - \frac{2\left(\tau^f - \tau^s\right)\left(\frac{\partial \tau^f}{\partial \Delta} - \frac{\partial \tau^s}{\partial \Delta}\right) - 2\frac{\Phi}{\Delta}\frac{\partial \tau^s}{\partial \Delta} + 2\frac{\Phi}{\Delta}\frac{\tau^s}{\Delta}}{2\sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{2\Phi\tau^s}{\Delta}}}\right) \qquad (28)\\ &= \frac{1}{2}\left(1 - \frac{\tau^f - \tau^s}{\sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{2\Phi\tau^s}{\Delta}}}\right)\frac{\partial \tau^f}{\partial \Delta} + \frac{1}{2}\frac{\partial \tau^s}{\partial \Delta} + \frac{\left(\tau^f - \tau^s\right)\frac{\partial \tau^s}{\partial \Delta} + \frac{\Phi}{\Delta}\frac{\partial \tau^s}{\partial \Delta} - \frac{\Phi}{\Delta}\frac{\tau^s}{\Delta}}{\sqrt{\left(\tau^f - \tau^s\right)^2 - \frac{2\Phi\tau^s}{\Delta}}}\end{aligned}$$

where $\frac{\partial \tau^f}{\partial \Delta} \leq 0$ and $\frac{\partial \tau^s}{\partial \Delta} \geq 0$.

From (28), we deduce that a sufficient condition such that $\frac{\partial \tau^{US}}{\partial \Delta} \geq 0$ is:

$$\left(\tau^f - \tau^s\right)\frac{\partial \tau^s}{\partial \Delta} + \frac{\Phi}{\Delta}\frac{\tau^s}{\Delta}\left(\frac{\partial \tau^s}{\partial \Delta}\frac{\Delta}{\tau^s} - 1\right) \geq 0 \qquad (29)$$

Obviously, if $\varepsilon^{\Delta}_{\tau^s} = \frac{\partial \tau^s}{\partial \Delta}\frac{\Delta}{\tau^s} \geq 1$ condition (29) always holds and then $\frac{\partial \tau^{US}}{\partial \Delta} \geq 0$.

If $\varepsilon^{\tau^s}_{\Delta} < 1$, we can deduce from $\tau^f - \tau^s \geq 2\sqrt{\frac{\Phi}{2\bar{a} - a_{med}}} \Leftrightarrow \frac{\Phi}{\Delta} \leq \frac{\left(\tau^f - \tau^s\right)^2}{2\tau^s}$ that $\left(\tau^f - \tau^s\right)\frac{\partial \tau^s}{\partial \Delta} + \frac{\left(\tau^f - \tau^s\right)^2}{2\tau^s}\frac{\tau^s}{\Delta}\left(\varepsilon^{\tau^s}_{\Delta} - 1\right) \geq 0 \Rightarrow \left(\tau^f - \tau^s\right)\frac{\partial \tau^s}{\partial \Delta} + \frac{\Phi}{\Delta}\frac{\tau^s}{\Delta}\left(\varepsilon^{\tau^s}_{\Delta} - 1\right) \geq 0$. We can therefore show that condition (29) is satisfied when $\left(2 + \frac{\tau^f - \tau^s}{\tau^s}\right)\varepsilon^{\tau^s}_{\Delta} \geq \frac{\tau^f - \tau^s}{\tau^s} \Leftrightarrow \varepsilon^{\tau^s}_{\Delta} \geq \frac{\tau^f - \tau^s}{\tau^f + \tau^s}$.

Proposition 3

As for proposition 1, let us define $\delta_t = \tau^f_t - \tau_t$ the difference between the fair and the effective level of taxation, eq (23) can be rewritten as:

$$\delta_t = \frac{2\bar{a} - a_{med}}{2\bar{a} - a_{med} + \frac{1}{\varphi_0 + \varphi_1\delta^2_{t-1}}}\left(\tau^f_t - \tau^s_t\right) \qquad (30)$$

Stationnarity can still be expressed as in eq. (27), i.e. $\delta^3 - \left(\tau^f - \tau^s\right)\delta^2 + \frac{1 + (2\bar{a} - a_{med})\varphi_0}{(2\bar{a} - a_{med})\varphi_1}\delta - \left(\tau^f - \tau^s\right)\frac{\varphi_0}{\varphi_1} = 0$. Denoting τ^* a root of equation (30), where $\tau^* = \tau^f(\tau^*) - \delta$, if $\left(\tau^f(\tau^*) - \tau^s(\tau^*)\right)^2 - \frac{4}{(2\bar{a}-a_{med})\varphi_1} > 0\ \forall\tau^*$, as $\lim_{\varphi_0=0}\Delta < 0$ and $\lim_{\varphi_0=\infty}\Delta > 0$, it exists $\tilde{\varphi}_0 > 0$ so that if $\varphi_0 \leq \tilde{\varphi}_0$ (30) exhibits three real roots τ^*.

As $\frac{\partial\Gamma^f}{\partial\tau} \leq 0$ and $\frac{\partial\Gamma^s}{\partial\tau} \leq 0$, knowing from (23) that $\tau^* \in \left]\tau^s(\psi,\Delta), \tau^f(\psi)\right]$, it entails that $\tau^s(\tau^*) \leq \tau^s(\psi,\Delta)$ and $\tau^f(\tau^*) \geq \tau^f(\psi)$, and then that:

$$\tau^f(\psi) - \tau^s(\psi,\Delta) \geq 2\sqrt{\frac{\Phi}{2\bar{a}-a_{med}}} \Longrightarrow \tau^f(\tau^*) - \tau^s(\tau^*) \geq 2\sqrt{\frac{\Phi}{2\bar{a}-a_{med}}}\ \forall\tau^*$$

where $\tau^f(\psi) \equiv \tau = \Gamma^f(\tau)$ and $\tau^s(\psi,\Delta) \equiv \tau = \Gamma^s(\tau)$.

Considering that $\tau^{EU} = \sup\{\tau^*\}$, by definition in $\varphi_0 = \tilde{\varphi}_0$ $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{EU}} = 1$. Besides, in $\varphi_0 = 0$ $\tau^{EU} = \tau^f(\psi)$, and then $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{EU}} = \left.\frac{\partial\Gamma^f}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^f(\psi)}$. From (32) we can verify that $\left|\left.\frac{\partial\Gamma^f}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^f(0)}\right| = 0$ whereas $\left|\left.\frac{\partial\Gamma^f}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^f(1)}\right| = \frac{(3-\sqrt{2})\left[1+(2-\sqrt{2})\left(2-(2-\sqrt{2})^2\right)\right]}{2\left[1-(2-\sqrt{2})^2\right]^2} \approx 3.6$. It exists then $\tilde{\psi} \in]0,1[$ so that $\psi \leq \tilde{\psi}$ entails $\left|\left.\frac{\partial\Gamma^f}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^f(\psi)}\right| \leq 1$. From (32) and (33) we can then compute $\tilde{\psi} \approx 0.55$ (see Fig. 4). By monotonicity, it follows that $\left|\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{EU}}\right| \leq 1$ $\forall\varphi_0 \leq \tilde{\varphi}_0$ and $\forall\psi \leq \tilde{\psi}$.

At last, considering that $\tau^{US} = \inf\{\tau^*\}$, $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}}$ can be either positive or negative. If $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}} \geq 0$, knowing from (23) that $\tau_t^*|_{\tau_{-1}=0} > 0$, by definition $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}} \leq 1$ if $\tau^f(\psi) - \tau^s(\psi,\Delta) \geq \sqrt{\frac{4}{(2\bar{a}-a_{med})\varphi_1}}$.

If $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}} \leq 0$, we can deduce from (23) and (24) that $\left|\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}}\right| \leq \left|\left.\frac{\partial\Gamma^s}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}}\right|$. In addition, as $\frac{\partial^2\Gamma^s}{\partial\tau_{-1}^2} = \frac{[1-\psi(1-\tau_{-1})]^2+\psi[1+(1-\tau_{-1})(2-\psi(1-\tau_{-1}))]}{[1-\psi(1-\tau_{-1})]^3}\psi\Gamma^s(1) \geq 0$, $\left|\left.\frac{\partial\Gamma^s}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}}\right| \leq \left|\left.\frac{\partial\Gamma^s}{\partial\tau_{-1}}\right|_{\tau_{-1}=0}\right|$ where $\left|\left.\frac{\partial\Gamma^s}{\partial\tau_{-1}}\right|_{\tau_{-1}=0}\right| = \psi\frac{3-\psi}{2(1-\psi)^2}\Gamma^s(1)$. As $\frac{\partial\Gamma^s}{\partial\tau_{-1}} \leq 0$ (see Appendix C), $\tau^f(\psi) - \tau^s(\psi,\Delta) \geq 2\sqrt{\frac{\Phi}{2\bar{a}-a_{med}}}$ implies in particular that $\Gamma^s(1) \leq \tau^f(\psi)\ \forall\psi$. It follows that $\sup_{\psi\leq\tilde{\psi}}\left(\left|\left.\frac{\partial\Gamma^s}{\partial\tau_{-1}}\right|_{\tau_{-1}=0}\right|\right) \leq \left\{\psi\frac{3-\psi}{2(1-\psi)^2}\tau^f(\psi)\right\}_{\psi=\tilde{\psi}} \approx 0.7$, where $\tau^f\left(\tilde{\psi}\right) \approx 0.21$, and then that $\psi \leq \tilde{\psi}$ if $\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}} \leq 0$ implies $\left|\left.\frac{\partial\tau_t^*}{\partial\tau_{-1}}\right|_{\tau_{-1}=\tau^{US}}\right| < 1$.

It follows that, considering a stationnary tax history $\{\tau_k = \tau_{-1}\}_{k=-\infty}^{k=t-1}$, $\tau^f(\psi) - \tau^s(\psi,\Delta) \geq 2\sqrt{\frac{\Phi}{2\bar{a}-a_{med}}}$ $\forall\psi \leq \tilde{\psi} < 1$ is a sufficient condition so that the model exhibits two local steady states characterized by $\tau^s(\psi,\Delta) < \tau^{US} < \tau^{EU} \leq \tau^f(\psi)$.

Appendix B. The fair-oriented cognitive process

The moral objective is characterized by

$F_t = \int_i \{[(1-\tau_t) y_{it} + \tau\bar{y}_t] - \hat{y}_{it}\}^2 di$

According to eq. (4),

$F_t = \int_i \{[(1-\tau_t)(a_i(1-\tau_t)+\varepsilon_i) + \tau_t\bar{a}(2-\tau_t)] - a_i(2-\tau_t)\}^2 di$

$= \int_i \{(1-\tau_t)\varepsilon_i - \tau_t(1-\tau_t)(a_i-\bar{a})\}^2 di.$

As a and ε are independently distributed over the population,

$F_t = (1-\tau_t)^2 \int_i \varepsilon_i^2 di + \tau_t^2(1-\tau_t)^2 \int_i (a_i-\bar{a})^2 di = (1-\tau_t)^2\sigma_\varepsilon^2 + \tau_t^2(1-\tau_t)^2\sigma_a^2.$

It follows that:

$$\frac{F_t}{\sigma_a^2} = (1-\tau_t)^2\left(L+\tau^2\right)$$

where $L = \frac{\sigma_\varepsilon^2}{\sigma_\alpha^2}$.

Consider now intrinsic motivation. According to eq. (14),

$F_t = \int_i \{[(1-\tau_t)(a_i(2-\tau_t)+\varepsilon_i) + \tau_t\bar{a}(2-\tau_t)] - a_i(2-\tau_t)\}^2 di$

$= \int_i \{(1-\tau_t)\varepsilon_i - \tau_t(2-\tau_t)(a_i-\bar{a})\}^2 di$

$= (1-\tau_t)^2 \int_i \varepsilon_i^2 di + \tau_t^2(2-\tau_t)^2 \int_i (a_i-\bar{a})^2 di = (1-\tau_t)^2\sigma_\varepsilon^2 + \tau_t^2(2-\tau_t)^2\sigma_a^2.$

It follows that:

$$\frac{F_t}{\sigma_a^2} = (1-\tau_t)^2 L + \tau^2(2-\tau_t)^2$$

Minimizing F_t in that case yields $\frac{\partial \frac{F_t}{\sigma_a^2}}{\partial \tau_t} = 4\left(1-\tau_t\right)\left[-\tau_t^2 + 2\tau_t - \frac{L}{2}\right]$ and $\frac{\partial^2 \frac{F_t}{\sigma_a^2}}{\partial \tau_t^2} = -4\left[-\tau_t^2 + 2\tau_t - \frac{L}{2}\right] + 8\left(1-\tau_t\right)^2$.

If $L > 2$, $-\tau_t^2 + 2\tau_t - \frac{L}{2} < 0\ \forall \tau_t \leq 1$. It follows that $\frac{\partial \frac{F_t}{\sigma_a^2}}{\partial \tau_t}(1) = 0$, $\frac{\partial^2 \frac{F_t}{\sigma_a^2}}{\partial \tau_t^2}(1) > 0$ and then $\underset{\tau_t \leq 1, L>2}{\arg\min} F_t = 1$.

If $L \leq 2$, $-\tau_t^2 + 2\tau_t - \frac{L}{2} = -\left(1 - \sqrt{1-\frac{L}{2}} - \tau_t\right)\left(1 + \sqrt{1-\frac{L}{2}} - \tau_t\right)$. It follows that $\frac{\partial \frac{F_t}{\sigma_a^2}}{\partial \tau_t}(1) = 0$, $\frac{\partial^2 \frac{F_t}{\sigma_a^2}}{\partial \tau_t^2}(1) \leq 0$ while $\frac{\partial \frac{F_t}{\sigma_a^2}}{\partial \tau_t}\left(1 - \sqrt{1-\frac{L}{2}}\right) = 0$, $\frac{\partial^2 \frac{F_t}{\sigma_a^2}}{\partial \tau_t^2}\left(1 - \sqrt{1-\frac{L}{2}}\right) \geq 0$ and then $\underset{\tau_t \leq 1, L\leq 2}{\arg\min} F_t = 1 - \sqrt{1-\frac{L}{2}}$.

Appendix C. Family background with stationary history

From (16), (19) and (13) we have:

$$c_{i,t} = \psi\left\{\left(1-\tau_t\right)\left[c_{j,t-1} + \left(2-\tau_t\right)a_i\right] + \tau_t\left[\bar{c}_{t-1} + \left(2-\tau_t\right)\bar{a}\right]\right\} \tag{31}$$

Assuming that offsprings' cognitive skills are randomly determined, independently of their parents' cognitive skills, entails also they are not correlated with their parents' cultural consumption. In such a case, when considering an institutional stationary history so that $\tau_s = \tau_{-1}, \forall s \leq t-1$, it follows from (31) that $\sigma_{c_{t-1}}^2 = \sigma_c^2\left(\tau_{-1}\right) = \psi^2\left(1-\tau_{-1}\right)^2\left[\sigma_c^2\left(\tau_{-1}\right) + \left(2-\tau_{t-1}\right)^2\sigma_a^2\right]$, or equivalently:

$$\sigma_c^2\left(\tau_{-1}\right) = \frac{\psi^2\left(1-\tau_{-1}\right)^2\left(2-\tau_{-1}\right)^2}{1-\psi^2\left(1-\tau_{-1}\right)^2}\sigma_a^2$$

and then following (11) and (21) that:

$$\tau_t^f = \Gamma^f\left(\tau_{-1}\right) = 1 - \sqrt{1 - \frac{\psi^2\left(1-\tau_{-1}\right)^2\left(2-\tau_{-1}\right)^2}{2\left[1-\psi^2\left(1-\tau_{-1}\right)^2\right]}}$$

It follows that:

$$\frac{\partial \Gamma^f}{\partial \tau_{-1}} = -\frac{\psi^2 (1-\tau_{-1})(2-\tau_{-1})\left[1+(1-\tau_{-1})\left(2-\psi^2(1-\tau_{-1})^2\right)\right]}{2\left(1-\tau_t^f\right)\left[1-\psi^2(1-\tau_{-1})^2\right]^2} \tag{32}$$

$$\frac{\partial \Gamma^f}{\partial \psi^2} = \frac{(1-\tau_{-1})^2(2-\tau_{-1})^2}{4\left(1-\tau_t^f\right)\left[1-\psi^2(1-\tau_{-1})^2\right]^2} \geq 0$$

Verifying in addition that $\lim\limits_{\tau=0}\left[\tau-\Gamma^f(\tau)\right] = -1+\sqrt{\sup\left(1-\frac{2\psi^2}{1-\psi^2},0\right)} \leq 0$ and $\lim\limits_{\tau=1}\left[\tau-\Gamma^f(\tau)\right] = 1$, we can derive that $\tau^f(\psi) \equiv \tau = \Gamma^f(\tau)$ is a monotonic and continuous function so that $\frac{d\tau^f}{d\psi} \geq 0$, $\tau^f(0) = 0$ and $\tau^f(1) = \sqrt{2}-1 \approx 0.41$ (see Fig. 4). We can also verify that solving $\tau = \Gamma^f(\tau)$ is equivalent to solving $\tau^3 - \left(3+\frac{2}{\psi^2}\right)\tau + 2 = 0$. Using the Cardano's formula, the general specification of $\tau^f(\psi)$ is under its trigonometric form as follows:

$$\tau^f(\psi) = 2\sqrt{1+\frac{2}{3\psi^2}}\cos\left[\frac{1}{3}\arccos\left(-\sqrt{\frac{27}{\left(3+\frac{2}{\psi^2}\right)^3}}\right)+\frac{4}{3}\pi\right] \tag{33}$$

From (31) we also have
$\bar{\pi}_{t-1} = \bar{\pi}(\tau_{-1}) = \frac{\psi}{1-\psi(1-\tau_{-1})}\left\{(1-\tau_{-1})(2-\tau_{-1})\bar{a}+\tau_{-1}\left[\bar{\pi}(\tau_{-1})+(2-\tau_{-1})\bar{a}\right]\right\}$
and
$\pi_{medt-1} = \pi_{med}(\tau_{-1}) = \frac{\psi}{1-\psi(1-\tau_{-1})}\left\{(1-\tau_{-1})(2-\tau_{-1})a_{med}+\tau_{-1}\left[\bar{\pi}(\tau_{-1})+(2-\tau_{-1})\bar{a}\right]\right\}$.
It follows that:

$$\bar{\pi}_{t-1} - \pi_{med,t-1} = \bar{\pi}(\tau_{-1}) - \pi_{med}(\tau_{-1}) = \frac{\psi(1-\tau_{-1})(2-\tau_{-1})}{1-\psi(1-\tau_{-1})}(\bar{a}-a_{med})$$

and therefore:

$$\tau_t^s = \frac{2(\bar{a}-a_{med})+(\bar{\pi}_{t-1}-\pi_{med,t-1})}{2\bar{a}-a_{med}} = \Gamma^s(\tau_{-1}) = \frac{\left[2+\frac{\psi(1-\tau_{-1})(2-\tau_{-1})}{1-\psi(1-\tau_{-1})}\right](\bar{a}-a_{med})}{2\bar{a}-a_{med}}$$

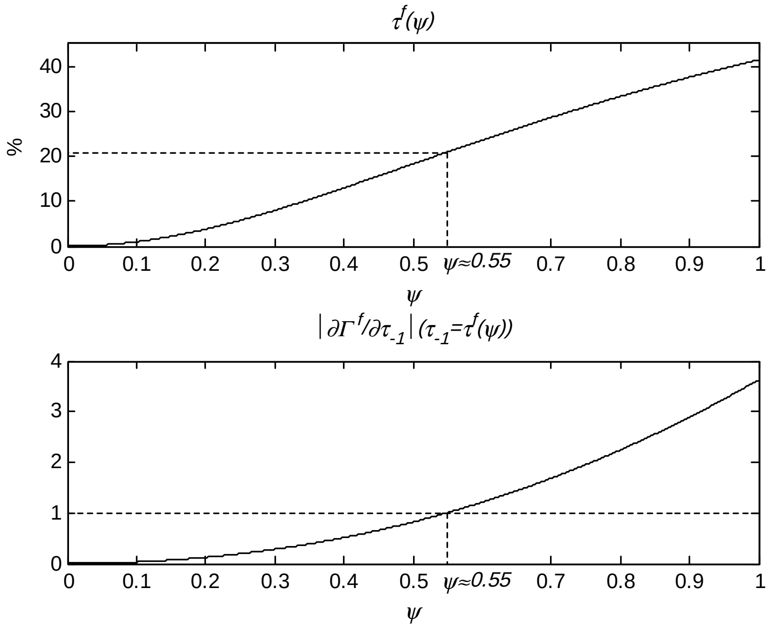

Figure 4: Characteristics of $\tau^f(\psi) \equiv \tau = \Gamma^f(\tau)$

It follows that

$$\begin{aligned}
\frac{\partial \Gamma^s}{\partial \tau_{-1}} &= -\frac{1+(1-\tau_{-1})\left[2-\psi(1-\tau_{-1})\right]}{2\left[1-\psi(1-\tau_{-1})\right]^2}\psi\Gamma^s(1) \leq 0 \\
\frac{\partial \Gamma^s}{\partial \psi} &= \frac{(1-\tau_{-1})(2-\tau_{-1})}{2\left[1-\psi(1-\tau_{-1})\right]^2}\Gamma^s(1) \geq 0 \\
\frac{\partial \Gamma^s}{\partial \Delta} &= \left[1+\frac{\psi(1-\tau_{-1})(2-\tau_{-1})}{2\left[1-\psi(1-\tau_{-1})\right]}\right]\frac{\partial \frac{2(\bar{a}-a_{med})}{2\bar{a}-a_{med}}}{\partial \Delta} \geq 0
\end{aligned}$$

and it results a continuous and monotonic function $\tau^s(\psi,\Delta)$ so that $\frac{\partial \tau^s}{\partial \psi} \geq 0$ and $\frac{\partial \tau^s}{\partial \Delta} \geq 0$, defined by:

$$\tau^s(\psi,\Delta) = \frac{\sqrt{\left[(1-\psi)\bar{a}+(\bar{a}-a_{med})\right]^2+\psi\bar{a}^2(\bar{a}-a_{med})}-\left[(1-\psi)\bar{a}+(\bar{a}-a_{med})\right]}{2\psi\bar{a}}$$