

# Belief in a Just World and Redistributive Politics

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*“Individuals have a need to believe that they live in a world where people generally get what they deserve.”* (Lerner (1982)).

## 1 Introduction

International surveys reveal striking differences between the views held in different countries concerning the causes of economic success or poverty, the extent to which individuals are responsible for their own fate, and the long-run rewards to personal effort. American “exceptionalism”, as manifested by the widely professed belief in the American Dream, is but the most striking example of this phenomenon. At the same time, ethnographic surveys by sociologists reveal that working-class and lower-middle-class individuals do not adhere to these views as dispassionate statisticians. On the contrary, they constantly struggle with the cognitive dissonance required to maintain (and pass on to their children) the view that effort, hard work, and good deeds will ultimately bring a better life, that crime does not pay, etc., in spite of recurrent evidence that life may not be that fair. Relatedly, experimental psychologists have documented the fact that most people have a strong need to believe that they live in a world that is just, in the sense that people generally get what they deserve, and deserve what they get. When confronted with data that contradicts this view they try hard to ignore, reinterpret, distort, or forget it –for instance by finding imaginary merits to the recipients of fortuitous rewards, or assigning blame to innocent victims.

This paper proposes a model of why people may feel such a need to believe in a just world; of why this need, and therefore the prevalence of the belief, may vary considerably across countries; and of its implications for redistributive policies (taxes and welfare payments) and the stigma born by the poor. At the heart of the model are general-equilibrium interactions between each individual’s psychologically-based “demand” for a belief in a just world (or similar ideology) and the degree of redistribution chosen by the polity.

Because of their imperfect willpower, individuals constantly strive to motivate themselves (or their children) towards effort, educational investment, perseverance in the face of adversity, and away from the slippery slope of idleness, welfare dependency, crime, drugs, etc. This is another recurrent finding from the sociological evidence. In such circumstances, maintaining somewhat rosy beliefs about the fact that everyone will ultimately get their “just deserts” can be very valuable. Furthermore, if enough individuals end up with the view that economic success is highly dependent on effort, they will ultimately represent a pivotal voting block, and set a low tax rate. Conversely, when individuals anticipate that society will carry out little redistribution, the costs of a deficient motivation to effort or savings are much higher than with high taxes and a generous safety net. Each individual thus has greater incentives to maintain his belief that effort ultimately pays, and consequently more voters end up with such a world view.

Due to these complementarities between individual’s desired beliefs or ideological choices, arising through the aggregate political outcome, there can thus be two equilibria. The first one

is characterized by a high prevalence of the “belief in a just world” among the population (a high degree of repression or denial of bad news about the world), and a relatively laissez-faire public policy; both are mutually sustaining. The other equilibrium is characterized by more “realistic pessimism” (less collective denial, leading to a more cynical majority), and a more generous welfare state, which in turn reduces the need for individuals to invest in optimistic beliefs. In this equilibrium there is also less stigma born by the poor, in the sense that fewer agents are likely to blame poverty on a lack of effort or willpower.

More generally, this paper proposes a mechanism for emergence and persistence of *collective* (society-wide) beliefs and cognitive distortions. Among the other applications considered here are consumerism (the pursuit of happiness through material consumption), fairness, and a theory of religion.

## **2 Self-reliance and redistributive policies: views from economics, sociology and psychology**

Why is the social contract (redistribution through taxes and transfers, unemployment and health insurance, education finance, and labor market regulation) so different between otherwise very comparable societies, such as the United States and Europe? Relatedly, what are the forces that limit the extent of redistribution in a democracy, preventing the poor majority from “soaking the rich”?

1. *Economists.* Economists have explored three types of explanations for these puzzles. The first one emphasizes differences in beliefs about the costs and benefits of redistribution, the true determinants of the social mobility (Hirschman (1973), Piketty (1995, 1998), Bénabou and Ok (2001), Alesina and La Ferrara (2001)), or workers’ estimates of the accuracy with which employers can measure their marginal products (Rotemberg (2002)). The present paper directly relates to this strand of work, but with a new, explicitly psychological perspective. One should note, however, that differences in beliefs are not a priori required to account for welfare states and laissez-faire societies. Indeed a second strand of work, stressing history-dependence in the joint determination of the income distribution and redistributive policy, shows how such regimes can arise as multiple steady-states under common economic and political fundamentals (Bénabou (2000), Saint Paul (2001), Hassler et al. (2002)). Finally, one can also invoke fixed, exogenous differences in political institutions (e.g., a centralized versus a federal State), although the question then arises of why these institutions persist (see Alesina, Glaeser and Sacerdote (2001) for a thorough discussion of these (and several other) potential explanations for the US-Europe contrast).

While differences in beliefs are not required to explain differences in the social contract, a lot of recent evidence suggests that citizens’ attitudes with respect to the sources of wealth or poverty (self-reliance versus societal factors) do play a major role. For instance, data from

the World Values Survey (see Alesina et al. (2001) and Keely (2002)) shows that only 29% of Americans believe that the poor are trapped in poverty, and only 30% that luck, rather than effort or education, determines income. The figures for Europeans are nearly double: 60% and 54% respectively. Similarly, Americans are more than twice as likely as Europeans to think that the poor are lazy (60% versus 26%).<sup>1</sup> Indeed, 59% of Americans agree or strongly agree that “in the long run, hard work usually brings a better life”; this view commands much less support in Europe, ranging from 34% in Sweden to 43% in Germany (Ladd and Bowman (2001)). Large differences in attitudes also exist within Europe, and particularly between OECD and Eastern European countries.<sup>2</sup> Although it is often not clear whether interviewees answer these questions in a “pretax” or in “posttax” sense –that is, whether they are describing the functioning of the market, the government, or both (our model will in fact highlight the interaction of these two perceptions), such enormous differences cannot be ignored. The traditional Marxist explanation is that workers, especially in America, hold a “false consciousness” about the fairness of market rewards and the prospects of improving their lot through effort, because they have been so indoctrinated or “brainwashed” by the propaganda of capitalists –who control education, the media, etc.<sup>3</sup> At the other extreme, in a sense, is the learning theory of Piketty (1995, 1998), where individuals and national populations can get stuck with incorrect beliefs about the mobility process in a purely “accidental” sense: because learning about the return to effort is costly, a “bandit problem” arises, leading individual or dynasties to stop experimenting with different levels of effort after a sufficiently favorable or unfavorable series of income realizations.

2. *Sociologists and political scientists.* Evidence from ethnographic surveys by sociologists and political scientists, however, paints a rather different picture: that of a “false consciousness” that is chosen and valued by the workers themselves –much like a religion. Lane (1959), Hochschild (1981, 1996) and Lamont (2000), for instance, conducted hundreds of detailed interviews of both White and Black working class and lower-middle-class individuals, among whom the mythical “median” voter presumably resides. They asked in particular about their views on the determinants of economic success and poverty, as well as their personal “values” and life stories. A first major finding that consistently emerges from this body of work is one of strongly *motivated beliefs*. These individuals desperately cling to a belief that effort, hard work, good deeds will ultimately pay off: people get what they deserve, and conversely, what they get, they must deserve (good or bad). At the same time, they face daily reminders that the world is not so just, and constantly struggle with the resulting “cognitive dissonance”. Typical is this

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<sup>1</sup>Alesina et al. (2001) also show that prevalence of these beliefs is strongly correlated, across countries, with measures of redistribution such as the share of transfers in GDP.

<sup>2</sup>The percentage who agree or strongly agree that “in your country, people get rewarded for effort” is 36.4% in the former group, and only 13.1% in the latter. The corresponding numbers for the statement that “in your country, people get rewarded for intelligence and skills” are 46% and 20% respectively (Suhreke (2001)).

<sup>3</sup>A somewhat related but more subtle argument is that of Roemer (1998), who shows how the introduction of a second issue in the political debate (abortion, crime, gun control, etc.) can effectively split the coalition of the poor that would otherwise arise to demand high levels of redistribution.

statement by Maria, a cleaning lady interviewed by Hochschild (1996):

«*“Once, Maria wonders if executives deserve their \$60,000 annual salary: “I don’t think they do all that [much] work, do you? Sit at their desk –they got it easy”. But she suppresses the thought immediately. “Well, maybe it is a lot of work. Maybe they have a lot of writing to do, or they have to make sure things go right. So maybe they are deserving of it”.*»

One can also note at this point a parallel with the discrepancy between the prevalent and persistent perception of the United States as an exceptionally mobile society, and the comparative empirical evidence on intergenerational income mobility, which actually shows no significant difference with European welfare states, and even sometimes a somewhat greater degree of mobility in the latter.<sup>4</sup>

The second key finding of the ethnographic literature on the working poor is the perceived overarching importance of *willpower* –what Lamont (2000) terms “the disciplined self”. The key challenge in the life of the interviewed subjects is the daily struggle to “keep it going,” not give up, and persevere in the face of adversity. These workers are frequently reminded, and constantly scared of, the fate of those who give up: welfare dependency, homelessness, drugs, etc. The very harsh judgements that they pass on the very poor and on welfare recipients (especially on Blacks) reflect their attributing poverty in large part to “giving up”, “not caring”, having “no values”, “no direction in life”, etc. As summarized by Lane (1959), they express “*the general view that success is a triumph of the will and a reflection of ability*”. Thus Vincent, a periodically unemployed unskilled worker, states that:

«*“If a person keeps his and works and works, and he’s banking it, good luck to him! That’s good. I wish to hell I could do it. I always said for years, ‘I wanna get rich, I wanna get rich.’ But then phew! My mind doesn’t have the strong will. I say, ‘Well, I’m gonna do it’. Only the next day is different”.* He believes that willpower is as essential as hard work to success; he has done plenty of work, but woefully lacks the will.» (Hochschild (1981).

3. *Psychologists.* Both of these key findings of the sociological and ethnographical literatures –weakness of will and motivated beliefs– are of course closely echoed by psychologists. The former relates to the large literature on self-control problems, which in recent years has attracted increasing attention from economists. The second relates to a nexus of cognitive biases involving attributions for success and failure, for reward and punishment. People are commonly subject

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<sup>4</sup>Couch and Dunn (1997) find greater mobility, especially in terms of education, in Germany than in the US, and Björklund and Jäntti (1997a) find similar results for Sweden. Rustichini, Ichino and Cecchi (1999), on the other hand, find lower mobility in Italy than in the US. See Björklund and Jäntti (1997b) for a recent survey of international comparisons, and Erikson and Goldthorpe (1992) for an earlier comparative study.

to what Ross and Nisbett (1991) describe as “the fundamental attribution error”, namely an excessive tendency to explain the behavior and outcomes of others by underlying “dispositions” (personal actions or attributes), rather than external circumstances or luck. Relatedly, they commonly display the “illusion of control”, namely an excessive confidence that they, and others, can affect over their own environment, and ultimately their own fate. Closely related, but more specific to the issues on which we focus, is what Lerner (1982) called the “*Belief in a Just World*” (henceforth BJW), that is, the nearly universal human tendency to want to believe that the world is just, in the sense that *people generally get what they deserve*.

A number of experiments thus show how, when confronted with information that contradicts the just-world view, people try hard to ignore, reinterpret, distort, forget or explain it away. A typical example involves the *reinterpretation of fortuitous rewards*, where subjects find imaginary merits and superior performances in the one person in a team whom they know to have been preselected at random to receive a the largest payment. Another well-known set of experiments shows that when confronted with an individual whose suffering they can do nothing to alleviate, many people end up “*blaming the victim*” –finding reasons why he brought the suffering on himself, or invoking compensating differentials (a silver lining). The more extreme but nonetheless common case is that of self-blame by the victims themselves. Of course, different individuals subscribe to different degrees to the just-world view. The scale devised by Peplau and Tyler (1975) to measure the intensity of individual’s BJW reveals very interesting correlates. High-BJW scorers are more likely to give stiff sentences to defendants convicted of a crime such as negligent homicide, but also to find the victims (e.g.,a in rape case) more culpable and “deserving” of their fate. They tend to see the status quo as desirable, to be politically and economically conservative, to believe in an active God, and to be less cynical than others. They have a greater tendency to justify the plights of Blacks and women, an a lower propensity to social and political activism (Peplau and Tyler (1975), Lerner (1982)). The BJW score is also correlated with having a Protestant ethic and a strong belief in internal locus of control (people being responsible for their own fate). We are not aware of international comparisons in the prevalence or intensity with which people subscribe to the BJW worldview, but Lamont’s (2000) comparative interviews with American and French workers strongly suggest that the latter would score much lower on the scale.

These findings lead us to examine why people should want, or “need”, to believe in a just world, and to what extent they can succeed in achieving (or imparting their children with) such a “false consciousness”, if the word is in fact not so just. We then ask why there should be such wide cross-country variations in the extent to which people subscribe to this ideology, and examine some of the political economy implications of the BJW, with particular attention to redistributive policy and the stigma born by the poor.

As explained earlier, and in line with the ethnographical evidence, our theory incorporates imperfect willpower (time-inconsistent preferences), self-deception through endogenously selec-

tive recall, attention or indoctrination, and *general equilibrium interactions* between individual’s “demand” for a BJW ideology, mediated through the level of redistribution chosen by the polity. This research thus brings together the literature on the political economy of redistribution and social mobility mentioned earlier, and the recent work in “psychology and economics” dealing with cognitive dissonance, strategic ignorance, overconfidence, self-deception, imperfect memory, wishful thinking, and the like (e.g., Akerlof and Dickens (1982), Carrillo and Mariotti (2000), Bénabou and Tirole (2002a, 2002b), Mullainathan (2002), Weinberg (2000), Köszegi (2000) and Landier (2001)).<sup>5</sup>

Finally, in stressing the links between individual beliefs about self-determination and equilibrium redistributive policies, our paper is most closely related to Piketty (1995, 1998) and to recent work by Fong (2001), Esteban and Kranich (2002) and especially Alesina and Angeletos (2002). These last authors are also concerned with explaining the coexistence of welfare and laissez-faire societies, each associated with different perceptions about the sources of economic disparities. Their model centers on a very different (and complementary) mechanism, based on concerns of social fairness rather than individual motivation, and the multiple equilibria to which it gives rise correspond to alternative self-fulfilling beliefs about the share of inequality due to variations in effort, rather than to different self-sustaining degrees of collective reality distortion.

### 3 An equilibrium model of ideological choice

#### 3.1 Technology and preferences

We consider an economy populated by a continuum of agents,  $i \in [0, 1]$ . Their actions and signals take place according to the timing indicated in Figure 1, and will be described moving backwards in time. Each individual produces with the following technology (similar to Piketty (1995)):

$$y^i = \begin{cases} 1 & \text{with probability } \pi^i + \theta e^i \\ 0 & \text{with probability } 1 - (\pi^i + \theta e^i) \end{cases}, \quad (1)$$

where  $e^i$  is their level of effort (or human capital investment) and  $\pi^i$  a preexisting advantage –human or social capital inherited from one’s parents, discrimination, etc.– that takes values  $\pi_1$  and  $\pi_0$  for proportions of agents  $\varphi < 1/2$  (“the rich”) and  $1 - \varphi$  (“the poor”) respectively; the average is  $\bar{\pi} \equiv \varphi\pi_1 + (1 - \varphi)\pi_0$ . Similarly, let  $\bar{e}$  and  $\bar{y} = \bar{\pi} + \theta\bar{e}$  denote the (endogenous) average levels of effort and output. Incomes  $y^i$  may be redistributed linearly at a tax rate  $\tau \leq 1$ , to be determined through majority voting. Incomes may be redistributed linearly at a tax rate  $\tau \leq 1$ , to be determined through majority voting. Since there is a priori no reason to exclude regressive

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<sup>5</sup>In particular, both Brocas and Carrillo (1999) and Battaglini, Bénabou and Tirole (2001) examine strategic interactions between time-inconsistent agents who engage in belief manipulation.

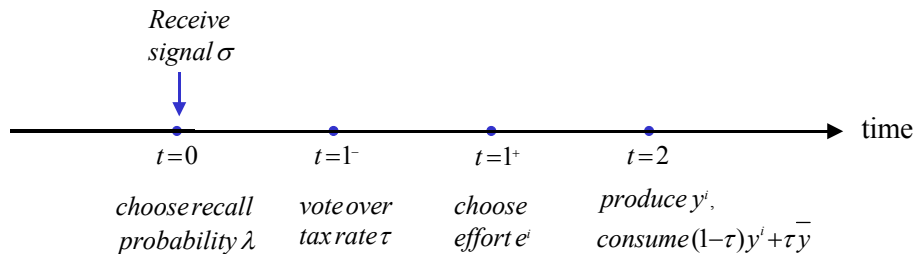


Figure 1: timing of signals and actions

taxation, we allow  $\tau < 0$ . Imposing  $\tau \in [0, 1]$  would only (slightly) complicate the analysis.

The true extent to which effort is rewarded in the long-term,  $\theta$ , is unknown. In the main part of the paper, agents’ “demand” for Just-World beliefs will stem endogenously (though not necessarily consciously) from adaptive concerns: a positive outlook on  $\theta$  helps motivate oneself –or one’s children– towards the arduous pursuit of long-term goals. In Section 5, however, we will show that similar results obtain when agents simply *like* thinking that they live in a world where the *aftertax* return to effort is high (because such a world is more predictable, more “fair”, or both), as well as when they have religious concerns for rewards in the afterlife.

We assume here that agents’ preferences are subject, at the time the effort is exerted, to a “salience of present” effect measured by  $1/\beta \geq 1$ . Thus at  $t = 1$ , the expected utility perceived by agent  $i$  when choosing  $e^i$  and facing a tax rate  $\tau$  is:

$$U^i = E_1 \left[ (1 - \tau) (y^i) + \tau \bar{y} - \frac{(e^i)^2}{2a\beta} \right] = E_1 \left[ (1 - \tau) (\pi^i + \theta e^i) + \tau (\bar{\pi} + \theta \bar{e}) - \frac{(e^i)^2}{2a\beta} \right]. \quad (2)$$

Ex ante (at  $t = 0$ ) however, he would evaluate the same payoff flows without the coefficient  $\beta$ . This means that the agent’s ex post effort choice will always be suboptimally low, due to his lack of willpower ( $\beta < 1$ ).

### 3.2 Signals and beliefs

At the beginning of the period,  $t = 0$ , each agent receives a signal  $\sigma^i$  about the return to effort,  $\theta$ . For simplicity we focus here on the case where these signals are perfectly correlated, reflecting for instance some aggregate information. The case where they represent conditionally independent draws from a common distribution that depends on  $\theta$  leads to similar results.<sup>6</sup> As indicated on Figure 2a, with probability  $1 - q$  agents receives bad news,  $\sigma^i = L$ , and with probability  $q$

<sup>6</sup>The case on which we focus here makes collective self-deception only more difficult, as initially all agents know the (relevant) true state of the world. On the other hand, by focusing on exogenous signals we are abstracting from the fact that the equilibrium tax rate  $\tau$  may also reveal some information about  $\theta$ . The more complex case where agents condition their effort decisions on this additional information leads to similar results, however (see the discussion that follows Proposition 3).



they receive no news at all,  $\sigma^i = \emptyset$ . As will be verified in Section 4.2, this “no news is good news” assumption serves only to simplify the analysis, and is inessential to the main results. Let  $F_L(\theta)$  and  $F_\emptyset(\theta)$  denote the conditional distributions in the two informational states; given risk-neutrality, only the expectations

$$\theta_L \equiv \mathbb{E}[\theta | \sigma = L] < \mathbb{E}[\theta | \sigma = \emptyset] \equiv \theta_H, \quad (3)$$

and in particular their difference  $\Delta\theta \equiv \theta_H - \theta_L$ , will be relevant. For each agent  $i$  we denote his signal as  $\sigma^i \in \{L, \emptyset\}$ , and his information set just after receiving  $\sigma^i$  as  $\Omega^i$ . When agents vote on taxes and choose effort levels, however, their information set is generally different, since they may not recollect certain signals received earlier (which could mean that either none was received, or that they have forgotten or repressed it). We denote their recollection and their information set at this later time as  $\hat{\sigma}^i \in \{L, \emptyset\}$  and  $\hat{\Omega}^i$  respectively, and their posterior beliefs about  $\theta$  as

$$\mu^i \equiv \Pr[\sigma = \emptyset | \hat{\Omega}^i]. \quad (4)$$

Figure 2 describes the cognitive technology through which individuals can (partially) manipulate their own beliefs, or those of their children, about whether or not the world is “just”. Formally, the probability

$$\lambda \equiv \Pr[\hat{\sigma} = L | \sigma = L] \quad (5)$$

that bad news will later on be recalled can be increased or decreased at some cost  $M(\lambda)$  – which can be monetary, temporal (cue-management, rehearsal) psychic (stress from repression), or reputational.<sup>7</sup> A typical cost function will have a U-shape, with the minimum occurring at some “natural” (costless) rate of recall  $\bar{\lambda} \leq 1$ ; see Figure 4. Recent experiments provide new and direct empirical support for such *malleability* of beliefs. Kay and Jost (2003) show that even minor cues (reading a very brief story with fictional “poor but happy”, “rich but unhappy”, etc., characters) can have significant effects on subjects’ beliefs concerning the justice of the US economic and political system.

Furthermore, and very importantly, our model can also be interpreted as describing a mechanism for the *intergenerational transmission of beliefs and “values”*, with parents devoting time and resources  $M(\lambda)$  to shielding their children’s belief in a “just world”, where effort is ultimately rewarded, from dissonant evidence that life may not be so fair after all. In this intergenerational interpretation of the model, (2) represents the *child’s preferences*, and the same formula with  $\beta = 1$  those of his *parents*.

The optimal choice of  $\lambda$ , which is determined jointly with the political outcome (that is,

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<sup>7</sup>See Bénabou and Tirole (2002a) for further discussions of selective awareness in light of the psychology literature. On cognitive dissonance, see Akerlof and Dickens (1982), and on imperfect memory see Mullainathan (2002).

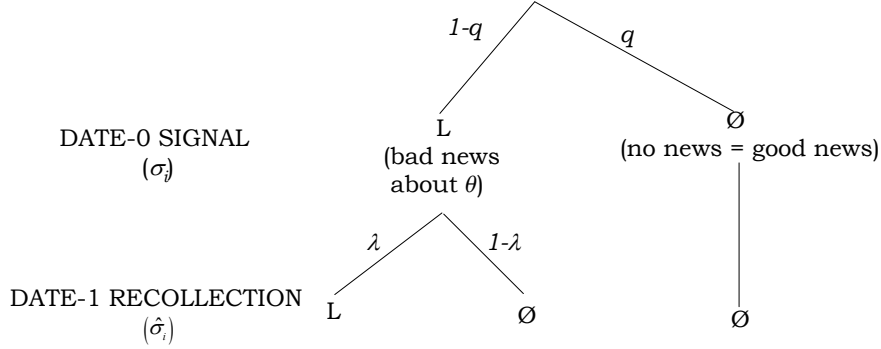


Figure 2: the determination of beliefs

through a general equilibrium mechanism), will be analyzed in Section 3.5. For the moment the only important features of the belief distortion mechanism are that: i)  $\lambda$  may be less than 1; ii) individuals are Bayesian –or at least not completely naive– and therefore aware to some extent that they, and others, may have a systematic tendency to see the world in a “positive” light. Consequently, they do not take the absence of adverse recollections ( $\hat{\sigma}^i = \emptyset$ ), or their parents’ exhortations that effort pays and crime does not, at face value. Instead, they assess the reliability of a “no bad news” recollection,  $\hat{\sigma}^i = \emptyset$ , as

$$r \equiv \Pr[\sigma = \emptyset \mid \hat{\sigma} = \emptyset; \lambda] = \frac{q}{q + (1-q)(1-\lambda)} \equiv r^*(\lambda). \quad (6)$$

This recall or information manipulation mechanism determines agents’ posterior beliefs when voting and choosing effort: if  $\hat{\sigma}^i = L$  then  $\mu^i = 0$ , whereas if  $\hat{\sigma}^i = \emptyset$  then  $\mu^i = r$ .<sup>8</sup>

### 3.3 Effort or investment decisions

Knowing the tax rate to which he will be subject but not the pretax return to effort, each agent  $i$  chooses effort optimally:

$$e^i = a\beta(1-\tau)\hat{\theta}^i, \text{ where} \quad (7)$$

$$\hat{\theta}^i \equiv E[\theta \mid \hat{\Omega}^i] = \mu^i\theta_H + (1-\mu^i)\theta_L \equiv \theta(\mu^i). \quad (8)$$

To determine agent  $i$ ’s preferences over alternative policies, on the other hand, it is not just his own beliefs concerning  $\theta$  that are relevant, but also *his beliefs about other agents’ beliefs*. Indeed, from (7):

<sup>8</sup>One can easily allow for a lesser degree of cognitive sophistication: multiplying the second term in the denominator by a parameter  $\chi \in [0, 1]$  allows (6) to capture the whole range between complete naiveté ( $\chi = 0$ ,  $r = 1$ ) and full Bayesian conditioning ( $\chi = 1$ ). The exposition will center here on the sophisticated case ( $\chi = 1$ ), but making agents less sophisticated (decreasing  $\chi$ ) makes the key results only more likely to hold.

$$E[\bar{y} \mid \hat{\Omega}^i] = \bar{\pi} + E[\theta \bar{e} \mid \hat{\Omega}^i] = \bar{\pi} + a\beta(1 - \tau)\hat{\Gamma}^i, \text{ where}$$

$$\hat{\Gamma}^i = E\left[\theta \cdot \int_0^1 \hat{\theta}^j dj \hat{\Theta} \mid \hat{\Omega}^i\right] = \mu^i \theta_H \theta(r) + (1 - \mu^i) \theta_L [\lambda \theta_L + (1 - \lambda) \theta(r)] \equiv \Gamma(\mu^i) \quad (9)$$

since in state  $\sigma = L$  everyone has the same posterior  $\mu^j = r$ , while in state  $\sigma = H$  a fraction  $\lambda$  of the population have  $\mu^j = L$  and the remaining  $1 - \lambda$  have  $\mu^j = r$  where  $\lambda$  is the awareness strategy used by all agents (we will verify that the equilibrium is indeed symmetric). Given these beliefs the agent's optimal choice of  $e^i$  results in an ex-post expected utility, at the time effort is chosen, of

$$U^i = (1 - \tau) \left( \pi^i + a\beta(1 - \tau) (\hat{\theta}^i)^2 \right) + \tau(\bar{\pi} + a\beta(1 - \tau)\hat{\Gamma}^i) - \frac{a\beta}{2}(1 - \tau)^2 \hat{\theta}^{i2}.$$

Ex ante, however, the agent evaluates the same utility flow according to preferences that differ from  $U^i$  by the fact that the effort cost (represented by the last term) is no longer magnified by the salience parameter  $1/\beta$ . We shall capture both ex-ante and ex-post preferences by defining the function:

$$V^i \equiv (1 - \tau) \left( \pi^i + a\beta(1 - \tau) (\hat{\theta}^i)^2 \right) + \tau(\bar{\pi} + a\beta(1 - \tau)\hat{\Gamma}^i) - \frac{a\beta^2}{2\gamma}(1 - \tau)^2 \hat{\theta}^{i2}, \quad (10)$$

where  $\gamma = \beta$  corresponds to utility evaluated at the moment where effort is expended, while  $\gamma = 1$  corresponds to utility before (and after) that time. This allows us to cover both the case where agents vote over  $\tau$  at the same time as they incur the investment cost  $e^i$ , and that where they vote before choosing  $e^i$ . More generally, they may use tax policy to try and correct the time-consistency problem ( $\gamma = 1$ ), or not ( $\gamma = \beta$ ).<sup>9</sup> Our results are robust to this modelling choice.

### 3.4 Social status, beliefs, and political attitudes

As intuition suggests, an agent's preferred tax rate decreases with his initial socioeconomic advantage,  $\pi$ . On the other hand, it need not always decrease with his degree of "optimism" about the productivity of effort,  $\theta(\mu^i)$ . This is because a higher  $\mu^i$  also raises the expected level of aggregate output, from which transfers are funded (via  $\Gamma(\mu^i)$ ). Conditions are thus required to ensure that this "tax base" effect is dominated by the combination of the own-income or POUM effect (an optimistic agent plans on working hard, and thus to move up relative to low-effort pessimists) and the standard concern for deadweight losses.

**Assumption 1** *Assume that  $\Delta\theta/\theta_L < 2\beta/\gamma$  and  $(1 - \beta/2\gamma) \theta_L^2 < (\bar{\pi} - \pi_0) / \beta a < \theta_L^2$ .*

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<sup>9</sup>For simplicity (and probably realism) we assume that voters do not condition their choice of  $\tau$  on turning out to be pivotal (Feddersen and Pesendorfer (1997)), nor strategically bias their vote to convey "good news" to induce others to work harder.

For all  $(\pi, \mu; \lambda, r)$ , the solution to the first-order conditions  $\partial V^i(\tau, \pi, \mu; \lambda, r)/\partial \tau = 0$  is

$$T(\pi, \mu; \lambda, r) \equiv 1 - \frac{\pi - \bar{\pi} + a\beta\Gamma(\mu)}{a\beta [2\Gamma(\mu) - (2 - \beta/\gamma)\theta(\mu)^2]}. \quad (11)$$

(Note that  $T(\pi, \mu; \lambda, r)$  need not a priori be less than 1). With a slight abuse of notation, we shall denote in particular

$$T_L(\pi; \lambda, r) \equiv T(\pi, 0; \lambda, r), \quad (12)$$

$$T_\emptyset(\pi; \lambda, r) \equiv T(\pi, r; \lambda, r), \quad (13)$$

the values of these functions corresponding to the two posteriors  $\mu = 0$  and  $\mu = r$  that agent with recollections  $\hat{\sigma} = L$  and  $\hat{\sigma} = \emptyset$  can have in an equilibrium. We shall refer to such agents as, respectively, “optimists” and “pessimists”.

**Proposition 1** *Under Assumption 1, each agent’s preferences are strictly concave in  $\tau$ , and his ideal tax rate  $\tau^i$  is  $T_L(\pi^i; \lambda, r)$  when he recalls an adverse signal ( $\hat{\sigma}^i = L$ ), and  $T_\emptyset(\pi^i; \lambda, r)$  when he does not ( $\hat{\sigma}^i = \emptyset$ ). These preferred tax rates are always decreasing in the individual’s initial endowment  $\pi^i$ , and furthermore:*

$$\begin{aligned} T_\emptyset(\pi_0; \lambda, r) &< T_L(\pi_0; \lambda, r) < 1 \\ T_\emptyset(\pi_1; \lambda, r) &< 0 < T_L(\pi_0; \lambda, r). \end{aligned}$$

Thus, in particular: a) beliefs in self-determination reduce an individual’s demand for redistribution; b) both believers and skeptics are found in every social class. These results closely match the two main empirical findings in Fong (2000).

One must next examine how these political preferences are aggregated through voting. In the “no bad news” state of the world  $\sigma = \emptyset$ , things are quite simple: everyone has posterior  $\mu = r$ , so with the poor forming a majority the equilibrium tax outcome is  $T_\emptyset(\pi_0; \lambda, r)$ . Consider now the state of the world where the initial news about  $\theta$  are bad:  $\hat{\sigma}^I = L$ . Proposition 1 shows that the pessimistic poor (i.e., those who recall the bad news) always want the highest tax rate  $T_L(\pi_0; \lambda, r)$ . If the equilibrium degree of recall  $\lambda$  is high enough that  $(1 - \varphi)\lambda > 1/2$ , they will be a majority, and impose their choice of policy. This political configuration, characterized by a low prevalence of the Belief in a Just World (BJW) among the population, is illustrated in the left panel of Figure 3. When the degree of forgetting or repression is high enough that  $(1 - \varphi)\lambda < 1/2$ , on the other hand, the pessimistic poor will be a minority, and since they have the most “extreme preferences” (the highest desired tax rate) they will also not be pivotal. Two cases may then occur.

*Case 1:* if  $T_L(\pi_1; \lambda, r) < T_\emptyset(\pi_0; \lambda, r)$ , then

$$\max \{T_L(\pi_1; \lambda, r), T_\emptyset(\pi_1; \lambda, r)\} < T_\emptyset(\pi_0; \lambda, r) < T_L(\pi_0; \lambda, r), \quad (14)$$

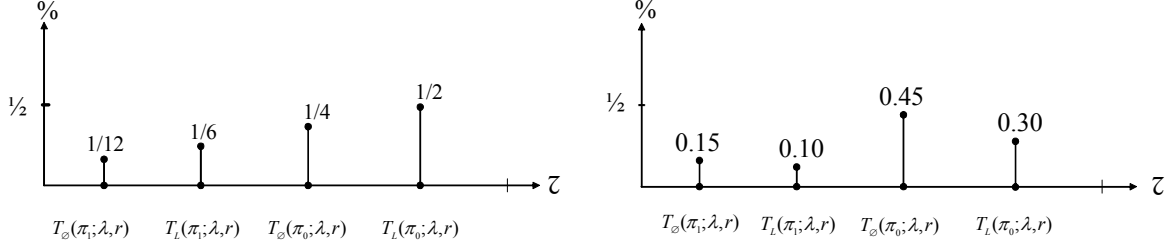


Figure 3: examples of low-BJW (left panel,  $\lambda = 2/3$ ) and high-BJW (right panel,  $\lambda = 1/4$ ) dominant ideologies, for  $\varphi = 1/4$ . In the first case the pivotal agent is disadvantaged and pessimistic, and sets  $\tau = T_L(\pi_0)$ . In the second case he is disadvantaged but optimistic, and sets  $\tau = T_\emptyset(\pi_0)$ .

and since the poor overall are a majority, the pivotal group is now that of the *optimistic* poor, which sets the tax rate  $T_\emptyset(\pi_0; \lambda, r)$ . This case, characterized by a high prevalence of the the Belief in a Just World, is illustrated on the right panel of Figure 3.

*Case 2:* if  $T_L(\pi_1; \lambda, r) > T_\emptyset(\pi_0; \lambda, r)$ , then

$$T_\emptyset(\pi_1; \lambda, r) < T_\emptyset(\pi_0; \lambda, r) < T_L(\pi_1; \lambda, r) < T_L(\pi_0; \lambda, r). \quad (15)$$

If  $\lambda < 1/2$  the optimists (rich plus poor) constitute a majority, so the pivotal group is again the optimistic poor, and the tax rate  $T_\emptyset(\pi_0; \lambda, r)$ . If  $\lambda > 1/2$ , on the other hand, the pivotal group is that of the pessimistic rich, who set the tax rate  $T_L(\pi_1; \lambda, r)$ .

In summary, and as illustrated by the “political outcome” locus on Figure 3, the pivotal vote switches from the pessimistic poor to a group that desires a lower tax rate whenever the individual recall probability declines from a value such that  $(1 - \varphi)\lambda > 1/2$  to a value such that  $(1 - \varphi)\lambda' < 1/2$ . Things are particularly simple if  $\lambda' < 1/2$ , since the pivotal agent is then always a disadvantaged one. As we discuss later on, this case has the additional property of being robust to allowing agents to try and infer the state of the world from the realized tax rate.

Of course each agent’s recall probability is endogenous, resulting from his repression or rehearsal decisions, which themselves depend on the taxes and transfers that he anticipates will prevail at the time of effort. We therefore now turn to the determination of these motivated beliefs, and to the fixed-point problem that ultimately defines an equilibrium.

### 3.5 Ideology as a cognitive investment

Consider now agent  $i$ ’s expected utility at the start of the period, i.e. at the time he receives his signal  $\sigma^i$ . This expected utility, denoted  $\tilde{U}^i$ , differs from  $U^i$  (utility perceived at the time of effort), for two reasons. First, the effort cost is not subject to a salience-of-the present effect. Second, the agent’s information set at this point,  $\Omega^i$ , includes the knowledge of the actual signal  $\sigma^i \in \{L, \emptyset\}$  that he has received. By contrast, when he votes and chooses effort later on, his

decisions will be based on the information set  $\hat{\Omega}^i$ , in which  $\sigma^i$  has been replaced by its (less informative, or “garbled”) subjective recollection  $\hat{\sigma}^i \in \{L, \emptyset\}$ . Thus:

$$\begin{aligned}\tilde{U}^i &\equiv E \left[ (1 - \tau)y^i + \tau\bar{y} - \frac{(e^i)^2}{2a} \mid \Omega^i \right] \\ &= (1 - \tau)\pi^i + \tau\bar{\pi} + a\beta\tau(1 - \tau)E \left[ \theta \cdot \int_0^1 \hat{\theta}^j dj \mid \Omega^i \right] \\ &\quad + a\beta(1 - \tau)^2 E \left[ E[\theta \mid \hat{\Omega}^i] \cdot \left( E[\theta \mid \Omega^i] - \frac{\beta}{2} E[\theta \mid \hat{\Omega}^i] \right) \mid \Omega^i \right],\end{aligned}\tag{16}$$

where  $\tau$  is the tax rate the agent anticipates will be chosen by society. It is worth pointing out here that the law of iterated expectations *does not apply* in the standard way to the present framework: because the agent may *forget*, his information set at  $t = 1$  generally does not contain the one had at  $t = 0$ , and so  $E \left[ E[\cdot \mid \hat{\Omega}^i] \mid \Omega^i \right] \neq E[\cdot \mid \Omega^i]$ .

The only state in which the agent has a decision to make with respect to his own or his offspring’s worldview is when his signal at  $t = 0$  is  $\sigma^i = L$ . If he ends up with a posterior belief  $\mu \in \{0, r\}$  he will exert effort  $e^i = \beta a(1 - \tau)\theta(\mu)$ , where  $\tau$  is the tax rate expected to prevail. Given that everyone else is using the informational strategy  $(\lambda, r)$ , this will result in an (ex-ante) intertemporal utility level

$$\begin{aligned}\tilde{U}_L(\pi, \tau, \mu; \lambda, r) &\equiv (1 - \tau)\pi^i + \tau\bar{\pi} + a\beta\tau(1 - \tau)\theta_L [\lambda\theta_L + (1 - \lambda)\theta(r)] \\ &\quad + a\beta(1 - \tau)^2 (\mu\theta_H + (1 - \mu)\theta_L) \left[ \theta_L - \frac{\beta}{2} (\mu\theta_H + (1 - \mu)\theta_L) \right].\end{aligned}\tag{17}$$

Note here that, in contrast to what happened in  $V^i$ ,  $\mu$  does not affect the size of the transfer that the agent expects to receive (third term in (17)). His expectation of what aggregate income will ultimately turn out to be reflects his current information,  $E[\theta \mid \sigma^i = L] = \theta_L$ , not the possibly distorted recollections of that data that he may have later on.<sup>10</sup>

An individual who recalls  $\hat{\sigma}^i = L$  will have  $\mu^i = 0$ , whereas for  $\hat{\sigma}^i = \emptyset$  he will have  $\mu^i = r$ , where  $(r, \lambda)$  denotes the (symmetric) equilibrium strategy played by all agents.<sup>11</sup> The cognitive optimization problem for an agent who receives the signal  $\sigma^i = L$  is therefore:

$$\max_{\lambda' \in [0, 1]} \left\{ \lambda' \tilde{U}_L(\pi, \tau, 0; \lambda, r) + (1 - \lambda') \tilde{U}_L(\pi, \tau, r; \lambda, r) - M(\lambda') \right\},\tag{18}$$

where  $M(\lambda')$  is the cost of achieving a probability of recall, or intergenerational transmission, equal to  $\lambda$ . A typical cost function is represented by the U-shaped curve on Figure 4, where  $\bar{\lambda}$

<sup>10</sup>Things would be different if the agent at date 0 cared not just about expected final payoffs, but also derived “anticipal utility” from the interim level of utility achieved at  $t = 1$ . In that case there would be consumption value to holding optimistic views about the size of aggregate output (which depends on  $\theta$ ), because it would allow the agent to temporarily savor the prospects of receiving a large transfer.

<sup>11</sup>The fact that  $\pi^i$  does not interact with beliefs in this expression makes clear that the optimal cognitive strategy is independent of initial endowments.

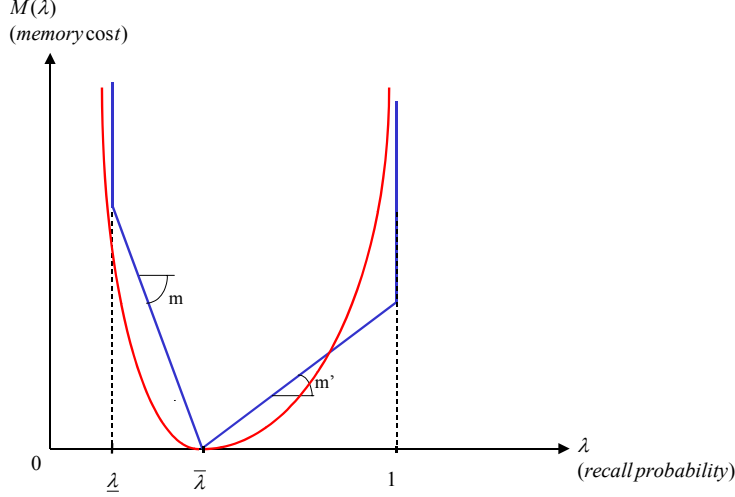


Figure 4: the awareness / indoctrination technology

represents the natural (costless) rate of recall.

Given (17), we can rewrite the optimal-awareness problem as:

$$\max_{\lambda' \in [0,1]} \left\{ \beta a (1 - \tau)^2 \left[ \lambda' \left( 1 - \frac{\beta}{2} \right) \theta_L^2 + (1 - \lambda') \left( \theta_L - \frac{\beta}{2} \theta(r) \right) \theta(r) \right] - M(\lambda') \right\}. \quad (19)$$

Two key effects are apparent in this formula:

- *The role of time inconsistency:* let  $M \equiv 0$ . When  $\beta \approx 1$ , agents always choose  $\lambda' = 1$  (information is always valuable); when  $\beta \approx 0$ , they always choose  $\lambda' = 0$  (self-motivation is critical).<sup>12</sup>
- *The role of taxes:* assume that  $\beta$  is low enough that repression is valuable, but now also costly ( $M' > 0$ ). Then, the lower is  $\tau$ , the greater is each individual or parent's incentive to *invest* in a Just-World ideology –that is, to choose a low  $\lambda'$ . This general-equilibrium feedback is thus a source of *endogenous complementarity* between individual's ideological choices.<sup>13</sup>

To simplify the problem, we shall take the memory-cost function to be piecewise linear, with natural (costless) rate of recall  $\bar{\lambda} \in (0, 1]$ , a minimum rate of recall  $\underline{\lambda} \in [0, \bar{\lambda})$  (or maximum degree of repression  $1 - \underline{\lambda} > 1 - \bar{\lambda}$ ), and linear marginal costs  $m > 0$  and  $m' > 0$  for repression and rehearsal respectively; see Figure 4.

**Assumption 2** *The memory cost function is given by:  $M(\lambda) = +\infty$  for  $\lambda < \underline{\lambda}$ ,  $M(\lambda) = m(\bar{\lambda} - \lambda)$  for  $\lambda \in [\underline{\lambda}, \bar{\lambda}]$  and  $M(\lambda) = m'(\lambda - \bar{\lambda})$  for  $\lambda \geq \bar{\lambda}$ .*

<sup>12</sup>To see the first claim, let  $z \equiv \theta_L / \theta(r)$ , and note that  $z \leq 2 - 1/z$ , with strict inequality when  $z < 1$ . The second claim is obvious.

<sup>13</sup>Things are somewhat more complicated than this simple intuition, however: when comparing equilibria, a lower  $\tau$  is associated with a lower  $(\lambda, r)$ , and hence a lower  $\theta(r)$ .

## 4 Equilibrium ideologies and policy outcomes

### 4.1 American “Belief in a Just World” versus European “Pessimism”

We are now able to characterize a (symmetric) politico-economic equilibrium as triplet  $(\lambda, r, \tau)$  such that:

$$\lambda \in \arg \max_{\lambda' \in [0,1]} \left\{ \lambda' \tilde{U}_L(\pi, \tau, 0; \lambda, r) + (1 - \lambda') \tilde{U}_L(\pi, \tau, r; \lambda, r) - M(\lambda') \right\}, \quad (20)$$

$$r = \frac{q}{q + (1 - q)(1 - \lambda)}, \quad (21)$$

$$\tau : \text{ is the majority tax rate in state } \sigma = L, \\ \text{ given the distribution of beliefs induced by } (\lambda, r). \quad (22)$$

As to the majority tax rate in state  $\sigma = \emptyset$ , is then simply  $T_\emptyset(\pi_0; \lambda, r)$ , given by (11). We shall now specifically look for conditions ensuring the existence of two (symmetric) equilibria –one broadly descriptive of European-type Welfare States, the other of the United States– as illustrated on Figure 5:

1) *Belief in a Just World*. When agents do not repress bad news about  $\theta$  very much ( $\lambda = \bar{\lambda}$ ), enough of the poor end up with pessimistic beliefs  $\mu^i = 0$  to constitute a majority, and thus impose a high tax rate  $\bar{\tau} = T_L(\pi_0; \bar{\lambda}, \bar{r})$ . This requires that  $(1 - \varphi)\bar{\lambda} > 1/2$ . The expectation of a high tax rate, and therefore a low return to effort, generates in turn only weak incentives to repress the fact that  $\theta$  is low. So individuals indeed make no effort at repression, choosing the natural recall rate  $\bar{\lambda}$ .

2) *Realistic Pessimism*. When agents try hard to repress bad news about the returns to effort ( $\lambda = \underline{\lambda}$ ), enough of the poor end up with relatively optimistic beliefs  $\mu^i = \bar{r}$  that  $(1 - \varphi)\underline{\lambda} < 1/2$ . As explained earlier, this implies that either:

a) the optimistic poor constitute a pivotal minority that gets to impose its preferred tax rate,  $\underline{\tau} = T_\emptyset(\pi_0; \underline{\lambda}, \underline{r}) < T_L(\pi_0; \underline{\lambda}, \underline{r})$ ;

b) the pivotal group is the optimistic rich, and the pessimistic poor side with them to impose the tax rate  $\underline{\tau} = T_\emptyset(\pi_1; \underline{\lambda}, \underline{r}) \in (T_\emptyset(\pi_0; \underline{\lambda}, \underline{r}), T_L(\pi_0; \underline{\lambda}, \underline{r}))$ ; this requires  $\underline{\lambda} > 1/2$ .

In both cases, the expectation of a relatively low tax rate, and therefore a high return to effort, generates in turn strong incentives to repress the fact that  $\theta$  is low. So individuals indeed make significant efforts at repression, which implies that a high fraction  $1 - \bar{\lambda}$  of them do forget the adverse information.<sup>14</sup>

The two key mechanisms underlying the multiplicity –one political, the other psychological– are illustrated on Figure 5. To formally establish (by construction) the existence of the BJW

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<sup>14</sup>In addition to these extremal equilibria, there may also be an equilibrium (or equilibria) where the first-order condition with respect to  $\lambda'$  holds with equality at some  $\lambda \in (\underline{\lambda}, \bar{\lambda})$ .



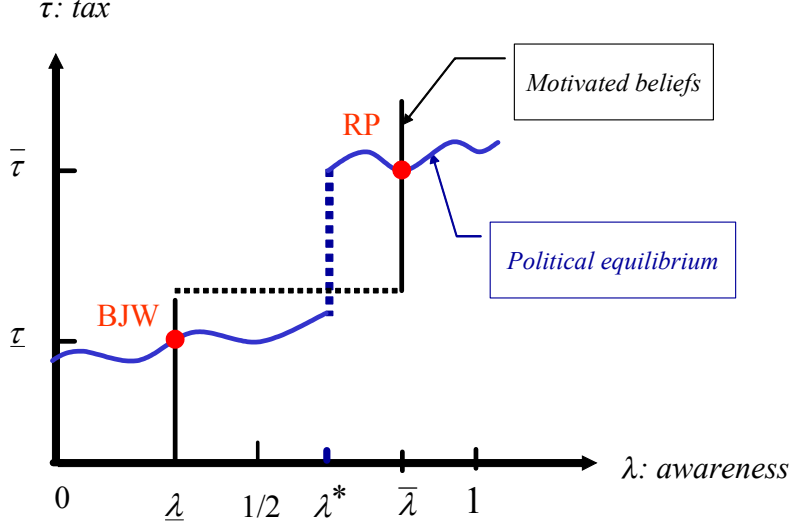


Figure 5: Ideological choices, political choices, and the set of equilibria (BJW: Belief in a Just World; RP: Realistic Pessimism).

and RP equilibria, let us start with the memory technology in Assumption (2), and assume that  $\underline{\lambda}$  and  $\bar{\lambda}$  satisfy:

**Assumption 3**  $(1 - \varphi)\underline{\lambda} < 1/2 < (1 - \varphi)\bar{\lambda}$ .

This condition ensures that the pivotal group switches from the pessimistic poor to a group that desires a lower tax rate (either the optimistic poor or the pessimistic rich) as  $\lambda$  declines from  $\bar{\lambda}$  to  $\underline{\lambda}$ . We next define  $\underline{\tau}$  and  $\bar{\tau}$  from Bayes' rule (20),  $\theta(\underline{\tau})$  and  $\theta(\bar{\tau})$  in the usual way, and use (11) to compute

$$\bar{\tau} \equiv T_L(\pi_0; \bar{\lambda}, \bar{\tau}), \quad (23)$$

$$\underline{\tau} \equiv \begin{cases} T_\emptyset(\pi_0; \underline{\lambda}, \underline{\tau}) & \text{if } \underline{\lambda} \leq 1/2 \\ \max \{T_\emptyset(\pi_0; \underline{\lambda}, \underline{\tau}), T_L(\pi_1; \underline{\lambda}, \underline{\tau})\} & \text{if } \underline{\lambda} > 1/2 \end{cases}. \quad (24)$$

A first issue is whether it is indeed the case that  $\underline{\tau} < \bar{\tau}$ . This is in fact not obvious, since the knowledge that other agents are likely to be more optimistic (due to their using the recall strategy  $\underline{\lambda}$  rather than  $\bar{\lambda}$ ), and therefore to work harder, tends to make a poor individual want to tax them more. We shall need again the conditions in Assumption 1 that ensure that this tax base effect (now operating through *other* agents' beliefs) is dominated by the direct concern for one's own income (net of effort costs).

**Proposition 2** *Under Assumption 1, the tax rates defined by (24) are such that  $\underline{\tau} < \bar{\tau}$ .*

Finally, the last key requirement for the coexistence of the two politico-economic equilibria is that an individual's incentive to forget or repress bad news about  $\theta$ , net of the cost required, be

positive in a low-tax, high-repression politico-economic environment, but negative in a high-tax, high-repression environment:

$$\begin{cases} \tilde{U}_L(\pi, \bar{\tau}, \bar{r}; \bar{\lambda}, \bar{r}) - \tilde{U}_L(\pi, \bar{\tau}, 0; \bar{\lambda}, \bar{r}) < m(\bar{\lambda} - \underline{\lambda}) \\ \tilde{U}_L(\pi, \underline{\tau}, \underline{r}; \underline{\lambda}, \underline{r}) - \tilde{U}_L(\pi, \underline{\tau}, 0; \underline{\lambda}, \underline{r}) > m(\bar{\lambda} - \underline{\lambda}) \end{cases} \quad (25)$$

for all  $\pi$ .<sup>15</sup> When  $\bar{\lambda} < 1$ , one also needs to check that no one wants to rehearse bad news:

$$\begin{cases} \tilde{U}_L(\pi, \bar{\tau}, \bar{r}; \bar{\lambda}, \bar{r}) - \tilde{U}_L(\pi, \bar{\tau}, 0; \bar{\lambda}, \bar{r}) > -m'(1 - \bar{\lambda}) \\ \tilde{U}_L(\pi, \underline{\tau}, \underline{r}; \underline{\lambda}, \underline{r}) - \tilde{U}_L(\pi, \underline{\tau}, 0; \underline{\lambda}, \underline{r}) > -m'(1 - \underline{\lambda}) \end{cases} \quad (26)$$

Clearly, if

$$\max \left\{ \tilde{U}(\pi, \bar{\tau}, \bar{r}; \bar{\lambda}, \bar{r}) - \tilde{U}(\pi, \bar{\tau}, 0; \bar{\lambda}, \bar{r}), 0 \right\} < \tilde{U}(\pi, \underline{\tau}, \underline{r}; \underline{\lambda}, \underline{r}) - \tilde{U}(\pi, \underline{\tau}, 0; \underline{\lambda}, \underline{r}), \quad (27)$$

for all  $\pi$ , the fixed-point conditions for  $\underline{\lambda}$  and  $\bar{\lambda}$  given by (25) will indeed hold for all  $m > 0$  in an appropriate range. We show in the appendix that the following are sufficient conditions for (27) to hold, as well as (26) for any  $m' > 0$ .

**Assumption 4** *Let*

$$1 + \left( \frac{\Delta\theta}{2\theta_L} \right) r^* < \frac{1}{\beta} < 1 + \left( \frac{\Delta\theta}{2\theta_L} \right) (1 + r),$$

where  $r^* \equiv \underline{r}$  if  $\bar{\lambda} = 1$  and  $r^* \equiv \bar{r}$  if  $\bar{\lambda} < 1$ .

This yields our main result, illustrated on Figure 5:

**Proposition 3** *Assume that Assumptions 1–4 are satisfied. Then, for a range of values of the repression cost  $m$  (and for all  $m' > 0$ ), there exist two politico-economic equilibria, with degrees of awareness  $\underline{\lambda}$  and  $\bar{\lambda}$  and associated tax rates  $\underline{\tau}$  and  $\bar{\tau}$ , such that  $\underline{\lambda} < \bar{\lambda}$  and  $\underline{\tau} < \bar{\tau}$ .*

## 4.2 Implications

Our central results pertain to the state of the world in which agents actually receive a signal, namely the not-so-just world ( $\sigma = L$ ). Proposition 3 then shows that redistribution is lower in the American-like BJW equilibrium than in its European-like RP counterpart.<sup>16</sup> This *endogenously shared* “American Dream” ideology has several important implications. On the macroeconomic side, it results in higher aggregate effort and output, both because agents are more optimistic about the (pretax) return to effort and because they face lower tax rates than in the welfare-state

<sup>15</sup>It is easily seen that the differences in (25)–(26) are in fact independent of  $\pi$ .

<sup>16</sup>One may worry that sophisticated agents in a BJW equilibrium would infer from the realized tax rate which state of the world they are in, thus defeating the purpose of their investing in “the American dream”. With  $\underline{\lambda} < 1/2$ , however, the BJW-equilibrium tax rate is the same in both states of the world ( $\tau = T(\pi_0, \underline{r}; \underline{\lambda}, \underline{r})$ ), and thus uninformative.

like equilibrium. On the welfare side, it improves agents deficient motivation to effort, alleviating their time-inconsistency problem. Its net value to the poor is more ambiguous, however, since they receive less transfers (and, as argued below, are more likely to be stigmatized).

In a world that is uninformative ( $\sigma = \emptyset$ ), the ranking of tax rates across equilibria – respectively  $T(\pi_0, \underline{r}; \underline{\lambda}, \underline{r})$  in the BJW equilibrium and  $T(\pi_0, \bar{r}; \bar{\lambda}, \bar{r})$  in its RP counterpart – is less clear. While an explicit ordering appears difficult to obtain, there is at least one effect that would tend to make the BJW equilibrium actually have a *higher* tax rate. This apparently paradoxical effect reflects the “rational skepticism” of Bayesian agents who are aware of their own (or their parents’) systematic tendency to repress bad news: the lower the probability  $\lambda$  with which bad news are transmitted, the lower their posterior confidence  $r(\lambda)$  that none were indeed received. The degree of confidence in a just world of optimistic agents in a BJW equilibrium, where  $\lambda = \underline{\lambda}$ , is thus lower than that of the optimistic agents in an RP equilibrium, where  $\lambda = \bar{\lambda}$ . It is of course higher than that of pessimistic agents, but when  $\sigma = L$  it is only optimistic beliefs that are relevant.

It is worth emphasizing here that neither the model’s message, nor the source of its results, is that “Americans” have a less *accurate* vision of economic mobility than “Europeans”. What matters is that their worldview (in the state of the world where there is information) be more *optimistic* –whether *rightly or wrongly*. For instance, assume that “no news are bad news”,  $\sigma \in \{H, \emptyset\}$ , instead  $\sigma \in \{L, \emptyset\}$ . Agents’ cognitive decision in the informed state  $\sigma = H$  is then how much to invest in rehearsing, and conveying to their children, that the world is just (which it is). There will be more investments of that type in the US-like equilibrium than in the European one, which again will be mutually sustaining with less redistribution.

Finally, one may worry that sophisticated agents in a BJW equilibrium would infer from the realized tax rate which state of the world they are in, thus defeating the purpose of their investing in “the American dream”. One may first observe that such aggregate information is of the very same type as the original signal  $\sigma$  (and in our simple case, perfectly correlated with it), so that agents have exactly the same incentives to forget or deny it as they had for  $\sigma$ . Secondly, one can avoid this problem by focussing on the case  $\underline{\lambda} < 1/2$ , in which the BJW equilibrium tax rate is actually the same in both states of the world ( $\tau = T(\pi_0, \underline{r}; \underline{\lambda}, \underline{r})$ ), and thus *uninformative*. In the RP equilibrium the tax rates always differ across states, but since agents are not investing in denial ( $\lambda = \bar{\lambda}$ ) to start with, this does not affect their cognitive decisions.<sup>17</sup>

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<sup>17</sup>When the natural rate of recall  $\bar{\lambda}$  is less than one, a low tax rate may “remind” them that the state is good ( $\sigma = \emptyset$ ), in which case their effort decision will be based on  $\mu = 1$  rather than  $\mu = \bar{r}$ . The computation of preferred and equilibrium tax rates is then slightly different (in (11),  $\theta(\mu)$  and  $\Gamma(\mu)$  are simply replaced by  $\mu\theta_H^2 + (1 - \mu)\theta_L^2$ , for  $\mu = \underline{r}$  (optimists) and  $\mu = 0$  (pessimists)), but the basic insights are the same.

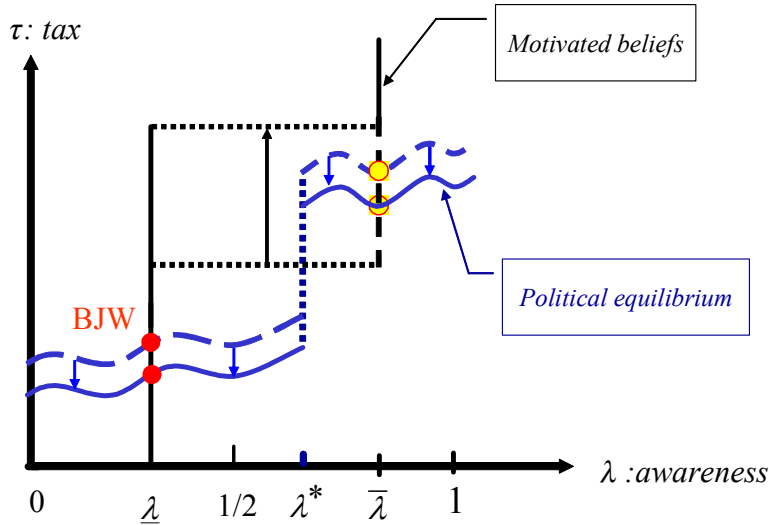


Figure 6: Skill-biased technological progress and induced ideological shifts

### 4.3 Technological change and ideological shifts

Suppose that the value of success increases: in (1), the payoff becomes some  $X > 1$ , capturing for instance the rise in the returns to college education over the last 25 years. What are the consequences for redistributive policy and equilibrium ideology?

There are two main effects of such skill-biased technological shift, as illustrated on Figure 6. First, the equilibrium tax-rate locus shifts down (over the relevant range). Indeed, as the expected return to effort is multiplied by  $X$ , for any given belief and tax rate agents will increase their efforts in proportion:  $e^i = aX\beta(1-\tau)\hat{\theta}^i$ . The intertemporal utility function (10) that voters maximize then becomes  $X$  times

$$V^i/X = (1-\tau) \left( \pi^i + aX\beta(1-\tau) \left( \hat{\theta}^i \right)^2 \right) + \tau(\bar{\pi} + aX\beta(1-\tau)\hat{\Gamma}^i) - \frac{aX\beta^2}{2\gamma}(1-\tau)^2 \left( \hat{\theta}^i \right)^2. \quad (28)$$

Thus each voter's ideal tax rate is given by the same formula as in (11), but with now  $a$  scaled up to  $aX$ , or equivalently with the endowment effect  $\bar{\pi} - \pi^i$  scaled down by  $X$ . Over the relevant range where poor agents –whether optimistic or pessimistic– are pivotal, this implies lower taxes rates. Note, however that the critical value  $\lambda^* \equiv 1/[2(1-\varphi)]$  remains invariant.

Second, and more interestingly, the motivated-beliefs locus shifts up. Indeed, a proper motivation to study, work hard, etc., becomes more valuable, making “positive” beliefs in a just world and individual autonomy even more functional than before. Formally, the cognitive decision problem of an agent with adverse information about  $\theta$  ( $\sigma^i = L$ ) becomes

$$\max_{\lambda' \in [0,1]} \left\{ \beta a X^2 (1-\tau)^2 \left[ \lambda' \left( 1 - \frac{\beta}{2} \right) \theta_L^2 + (1-\lambda') \left( \theta_L - \frac{\beta}{2} \theta(r) \right) \theta(r) \right] - M(\lambda') \right\}. \quad (29)$$

Thus all economic payoffs are simply scaled up by  $X^2$ , reflecting both the direct productivity effect and the effort response. Equivalently, cognitive costs (the function  $M$ ) are scaled down by  $X^2$ . As a result, the optimal  $\lambda$  decreases for any given  $\tau$ , as shown on Figure 6; furthermore, this shift is typically larger than that of the other curve.<sup>18</sup>

Putting both effects together, the most interesting point is that whereas, by itself, the rise in  $X$  (e.g., the skill premium) would have led only to a relatively small decline in redistribution in each equilibrium, when ideology is endogenous it can trigger a substantial shift in beliefs about the dependence of success on personal effort –even though  $\theta$  has not changed at all. This, in turn, may cause the RP-Welfare State equilibrium to become unsustainable, leaving only the BJW- Laissez Faire outcome. This result may help resolve the paradox of why, in many industrialized countries, the widening of income inequality due to skill-biased technological change and international trade has been accompanied by significant attitudinal shifts towards greater individualism and a general retrenchment of redistributive policies.

#### 4.4 The lazy poor

Suppose now that a fraction  $x$  of people are “lazy”, by which we mean that they have no willpower with respect to effort  $\beta = 0$ .<sup>19</sup> Since these individuals will never work, they also have no incentive (at least, no motivational incentive, which is what we are focussing on here) to maintain a belief in the just world.

We assume for simplicity that “laziness” and the initial endowment  $\pi \in \{\pi_0, \pi_1\}$  are uncorrelated, and that  $x$  is small enough that the presence of lazy agents does not affect any of the political equilibria constructed before (or perhaps they do not even bother to vote).

Suppose now that a non-lazy agent  $i$  observes a person who has failed (economically) in life, that is, who has *ex-post* income  $y = 0$ . What kind of *attributions for failure* will agent  $i$  then make, and how do they depend on his chosen ideology? Given his posterior belief  $\mu^i$  that effort pays, agent  $i$  assesses the probability that someone’s poverty is due to laziness as:

$$p^i \equiv \Pr \left[ \beta = 0 \mid y = 0, \hat{\Omega}^i \right] = \frac{(1 - \bar{\pi})x}{(1 - \bar{\pi})x + (1 - x)(1 - \bar{\pi} - a\beta(1 - \tau)\Gamma(\mu^i))}.$$

Focussing again on the not-so-just world ( $\sigma = L$ ), we see that  $p^i$  tends to be higher in the BJW than in the RP equilibrium, for two reasons. First, the net-of-tax rate  $1 - \tau$  is higher. This tends to make all agents view the poor as more likely to not have worked. Second, when  $\underline{\lambda} < 1/2$  the majority of agents in the BJW equilibrium are optimistic ones, whose estimate of the average

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<sup>18</sup>The figure corresponds once again to the piecewise-linear case, in which  $m$  and  $m'$  are effectively scaled down by  $X^2$ . As a result, the threshold  $\tau^*$  above which agents shift from  $\underline{\lambda}$  to  $\bar{\lambda}$  rises, in such a way that  $1 - \tau^*$  is scaled down by  $X$ . For the equilibrium tax schedule, by contrast,  $1 - T(\pi_0, \mu; \lambda, \tau)$  is scaled down by less than  $X$ , as can be seen from (11).

<sup>19</sup>A formally equivalent assumption would be that they have a prohibitively high cost of effort,  $1/a = +\infty$ ; this however, does not correspond nearly as well to the common understanding of “laziness”.

contribution of equilibrium effort to success is higher than that of the pessimists who constitute a majority in the RP equilibrium ( $\Gamma(x) > \Gamma(0)$ ). In this sense, there is a greater prevalence of “stigma” on the (ex-post) poor in a BJW equilibrium, especially among the politically pivotal classes. This negative inference attached to those who failed is likely to trigger emotional reactions such as resentment, anger, etc. Furthermore, there is good evidence that agents have “selectively altruistic” social preferences, in the sense that they like to help only “those who help themselves”, i.e. the non-lazy poor (e.g. Fong (2000)). In further extension of this model we shall incorporate such preferences, and show that the BJW-induced stigma will translate into lower transfers.<sup>20</sup>

Another related mechanism arises when agents do not know the overall fraction  $x$  of the population who are lazy. They will then make inferences about it from the observed poverty rate, together with their own beliefs about  $\theta$ . Once again, if the pivotal group maintains a belief in the just world ( $\hat{\sigma} = \emptyset$ ), they will think that more of the poor are lazy (they will have a higher estimate of  $x$ ) than if they are “realistic pessimists” ( $\hat{\sigma} = L$ ). As a result, they are likely to want to give less transfers to those who failed. The tax rate required to finance these transfers will then be lower and, as before, this will increase individual incentives to maintain the BJW.

## 5 Religion, hedonism, and other collective beliefs

### 5.1 Consumerist versus leisure-oriented societies

The model can be reinterpreted as one where the uncertainty, and therefore the attitudinal differences both within and across countries, bear on the degree to which “*money buys happiness*” –meaning the extent to which consumption of material goods, rather than leisure and related non-market activities, generates lasting increases in wellbeing. Indeed it is a common (though far from established) view that in modern societies individuals excessively value material consumptions relative to “relational” ones: family, friends, community service, etc. (e.g., Putnam (2000), Frank (2000)). Psychologists in particular point to the phenomena such as the “hedonic treadmill” and individual’s common general tendency to underestimate the speed at which their level of well being will adapt to both increases and decreases in life circumstances Gilbert et al. (1998), Kahneman (2000)). While such adaptation has been found to operate on both changes in material consumption (changes in income, wealth, tenure) and relational ones (marriage, divorce, etc.). The claim is often made that the failure of affective forecasting operates differentially, leading to a bias towards material consumption at the expense of relational ones or of self-development (e.g., Frey and Stultzer (2003)). Why it should be so, however, is typically not explained; we provide here a simple, motivation-based, theory.

Consider the same model as before, but with  $\theta \equiv 1$  in the production function (1). Now,

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<sup>20</sup>On redistribution with (somewhat different) preferences for fairness, see also Alesina and Angeletos (2003).

however, income  $y^i$  is an argument of a standard (indirect) utility function, which for simplicity we again take to be linear. Thus, at date  $t = 1$  :

$$\hat{U}^i \equiv E \left[ \left( \frac{\theta}{P} \right) [(1 - \tau) (y^i) + \tau \bar{y}] \Big| \hat{\Omega}_i \right] - \frac{(e^i)^2}{2a\beta}. \quad (30)$$

where  $\theta$  is imperfectly known preference parameter (e.g., speed of hedonic adaptation) and  $P$  a known price deflator. For simplicity, let us assume away initial differences in endowments:  $\pi_0 = \pi_1 = \bar{\pi}$ ; redistributive concerns will remain operative due to agents' different perceived mobility prospects. Clearly, this model is isomorphic to the previous one (also with common  $\pi^i$ 's), so that under essentially similar conditions there will be two equilibria:

1) *A consumerist and laissez faire equilibrium:* a large fraction of the population believes that consumption is an important key to happiness; as a result they opt for high levels of effort and vote for low levels of redistribution (as they do not want their effort to subsidize the consumption of pessimistic agents, and are concerned about deadweight losses). A low degree of redistribution, in turn, increases the incentives to believe, or teach to one's offspring, that the (now predictable) fruits of effort will translate into lasting improvements well-being.

2. *A leisure-oriented and redistributive equilibrium:* the mechanism works in reverse here, with a majority or pivotal group of holding more negative views about the value of material consumption, opting instead for leisure, family and social life, etc.

The previous sections' comparative results and remarks also carry over. For instance, an increase in productivity or in the terms of trade  $X = 1/P$  may trigger a massive shift from "traditional values" (communal or village life, extended families, social interactions, etc.) to a more atomistic ("bowling alone") and mass-consumption society. On the welfare side, materialistic beliefs are a mixed blessing, helping individuals to overcome their tendency to underprovide effort but resulting in lower than expected levels of satisfaction.

## 5.2 Intrinsically desirable beliefs in fairness

We have so far stressed the potential usefulness of beliefs in a Just World in facilitating the pursuit of long-term goals in a model with conflicting ex-ante and ex-post preferences (either intra- or intergenerational). This is an important motive, stressed by psychologists (for instance in the "self-efficacy" and "illusion of control" literatures) an familiar to most parents. But both psychologists (e.g., Lerner (1982)) and casual empiricism (including movie endings) suggest that many people also just *like to think* that they live in a Just World. Their sense of fairness may be offended if they believe individual's fate to be predetermined by social origins or discrimination, or they may find the idea that it is essentially random and beyond one's control anxiety-provoking. Such hedonic motives for just-world beliefs can easily be substituted for, or combined with, the motivational one.

To see this, let us augment the agent's utility at dates  $t = 1, 2$  with as follows:

$$\hat{U}^i \equiv E \left[ (1 - \tau) (y^i) + \tau \bar{y} - \frac{(e^i)^2}{2a\beta} \Big| \hat{\Omega}_i \right] + u \left( (1 - \tau) \hat{\theta}^i \right),$$

where we recall that  $\hat{\theta}^i \equiv \mu^i \theta_H + (1 - \mu^i) \theta_L = E \left[ \theta \mid \hat{\Omega}_i \right]$  is the agents' posterior belief at date  $t = 1$  and after. In the first term  $\beta$  could now be set equal to 1, as hyperbolicity in preferences is no longer needed. To demonstrate the equivalence between the two motives for cognitive manipulations, however, we allow for any  $\beta \leq 1$  in what follows.

The specific form of the utility function  $u$  is here not very important; what is key is that agents care about the *net* return to effort  $(1 - \tau)\theta$  rather than the gross return  $\theta$ . This assumption is the natural one (e.g., a world where  $\theta$  is high but the government takes away all the fruits of effort would not be a very "fair" one), and it delivers the key *complementarity* between agents' ideological choices that is at the center of the model. The more agents acquire or maintain beliefs that  $\theta$  is high, the lower will  $\tau$  be, and therefore the more satisfying it will be (at  $t = 1, 2$ ) to think that  $\theta$  is high (and the more frustrating to think that it is low). Thus, at time zero, the greater the incentive to manipulate future awareness in that direction.

We now verify these intuitions. Since the presence of the hedonic term has no impact on effort decisions at  $t = 2$  (conditional on  $\tau$  and  $\mu^i$ ), voters' utility at time  $t = 1$  is now:

$$V^i \equiv (1 - \tau) \left( \pi^i + a\beta(1 - \tau) \left( \hat{\theta}^i \right)^2 \right) + \tau (\bar{\pi} + a\beta(1 - \tau) \hat{\Gamma}^i) - \frac{a\beta^2}{2\gamma} (1 - \tau)^2 \hat{\theta}^{i2} + u \left( (1 - \tau) \hat{\theta}^i \right). \quad (31)$$

The new term will just reinforce the preexisting tendency of an agent's ideal desired tax rates  $\tau^i$  to decline with his level of optimism about  $\theta$ . More illuminating is its effect on cognitive decisions at  $t = 0$ , that is, on ideological choice. The decision of an agent with bad news  $\sigma^i = L$  is now:

$$\max_{\lambda' \in [0,1]} \left\{ \lambda' \left[ \tilde{U}_L(\pi, \tau, 0; \lambda, r) + \rho u((1 - \tau)\theta_L) \right] + (1 - \lambda') \left[ \tilde{U}_L(\pi, \tau, r; \lambda, r) + u((1 - \tau)\theta(r)) \right] - M(\lambda') \right\}.$$

Taking into account the previously computed expressions for  $\tilde{U}_L$ , the value of a marginal decrease in awareness  $\lambda$  (gross of the corresponding cost  $M'(\lambda)$ ) is:

$$\begin{aligned} \Psi(\tau; \lambda, r) \equiv & \beta a(1 - \tau)^2 \left[ \left( \theta_L - \frac{\beta \theta(r)}{2} \right) \theta(r) - \left( 1 - \frac{\beta}{2} \right) \theta_L^2 \right] \\ & + u((1 - \tau)\theta(r)) - u((1 - \tau)\theta_L) \end{aligned} \quad (32)$$

The first term is the previously studied motivational incentive to lower  $\lambda'$ ; as shown below, it becomes negative (the agent wants the truth) when  $\beta$  is close enough to 1. The second term



represents the extra incentive that arises from any increasing hedonic-belief function.<sup>21</sup> Without significant loss of generality, let us therefore choose a functional form that will make clearest the equivalence between motivational and hedonic effects. With  $u(c) \equiv \rho c^2/2$ , the incentive to forget (gross of the required costs) takes the form:

$$\begin{aligned}\Psi(\tau; \lambda, r) &= (1 - \tau)^2 \left\{ \beta a \left[ \left( \theta_L - \frac{\beta \theta(r)}{2} \right) \theta(r) - \left( 1 - \frac{\beta}{2} \right) \theta_L^2 \right] + \frac{\rho}{2} [\theta(r)^2 - \theta_L^2] \right\} \\ &= (1 - \tau)^2 (\theta(r) - \theta_L) \left( \frac{\beta a}{2} \right) \left\{ 1 - \beta + \frac{\rho}{\beta a} - \frac{\theta(r) - \theta_L}{\theta(r) + \theta_L} \right\}.\end{aligned}\quad (33)$$

This shows that the coefficient  $\rho$  plays essentially the same role, in determining the demand for just-world beliefs, as the degree of time inconsistency  $1 - \beta$ : the term that governs the sign and magnitude of the incentive to lower  $\lambda'$  is  $1 - \beta + \rho/\beta a$ . Thus even when there is no time inconsistency ( $\beta = 1$ ) as long as  $\rho$  is larger than some minimum value (less than  $a$ ), there will be a positive incentive to engage in belief manipulation (to be traded off against the marginal cost  $M' = m$ ). Furthermore, the net incentive which again will be higher, the lower is the expected tax rate  $\tau$ .

### 5.3 A theory of religion [incomplete]

A more subtle extension of the model is one that allows us to endogenize religious beliefs, and cross-country differences in them. The specific set of religious beliefs that we focus on are those linked (or similar) to the “Protestant work ethic”: a belief that there is an afterlife, and that rewards in the hereafter will be determined according to work effort, industriousness, etc., over the course of one’s terrestrial lifetime.<sup>22</sup> The alternative is that either there is no afterlife or if there is one its rewards are determined according to criteria that are independent of industriousness, or even antithetical to material success (good deeds towards others, vows of poverty and asceticism, contemplation, the “extinction” of desires, etc.). Uncertainty over the existence and or nature of divine rewards (and punishments) can be simply modelled as follows:

a) in the production function, let  $\theta \equiv 1$ ; thus everyone agrees on the nature of economic processes.

b) preferences involve no time-inconsistency ( $\beta = 1$ ) but include an anticipal term for the “value of the afterlife”  $u(e, \theta)$ , where  $u$  is increasing in both arguments, the two are complements, and  $\theta$  is unknown. In what follows we shall take, without much loss of generality  $u(e, \theta) =$

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<sup>21</sup>Including the case where  $u$  is linear, which means that the complementarity (and therefore multiplicity) results do not depend on any non-linearity.

<sup>22</sup>Our purpose here is of course not to get into the details of different religious doctrines. We will just observe that effort and industriousness could yield rewards in the hereafter either because it is considered to be good per se, or because it signals a characteristic specific to the “chosen” (see Ainslie (1992) for a thoughtful discussion of this idea originating with Weber, and Bodner and Prelec (2002) and Bénabou and Tirole (2002b) for models of self-signaling).

$(\theta - 1)e$ , where  $\theta_H > \theta_L \geq 1$  are again the two possible (expected) values of  $\theta$ , conditional on  $\sigma = \emptyset, L$ . The complementarity mechanism now operates as follows:

- The more religious the individual (the higher  $\mu^i$ ), the harder he works.
- A more religious agent wants lower tax rates, for three reasons: as before, because he does not want to redistribute income towards less hard-working “unbelievers”, and because of deadweight loss concerns; but now also because he fears that high taxes will reduce his own effort, and therefore his heavenly rewards. Thus, once again, the greater the proportion of religious individuals, the lower the equilibrium tax rate.
- Conversely, the anticipation of a low tax rate increases the value of investing in (or teaching) religious beliefs –and this, even though divine rewards are of course out of the reach of earthly redistribution. The mechanism is that if the individual knows he will work hard because of low taxes, then believing that effort carries important rewards in the afterlife will result in high “anticipatory” utility during his entire lifetime. If he expects to work little, on the other hand (because of high taxes or due to personal characteristics) then fervent religious beliefs are not very welfare-enhancing.

Therefore, under appropriate conditions [to be established], we will again have two equilibria:

1) *A high-religiosity / Protestant work ethic equilibrium*, accompanied by low redistribution. Note also that religious individuals are also those with politically conservative (anti-redistribution) beliefs, which is a very robust empirical finding [references].

2. *An equilibrium characterized by a greater predominance of agnosticism, or religions that do not stress individual industriousness in the pursuit of worldly achievements.*

[Add discussion and references: Peplau and Tyler (1975) on BJW and religious beliefs; Guiso et al. (2002), Barro and Mc. Cleary (2003) on religion and growth...]

## 6 Conclusion

Is the “American dream,” according to our theory, just a self-sustaining collective illusion? The answer is more subtle than a simple yes or no. While the “Belief in a Just World” equilibrium does involve more reality distortion –more overestimation of the extent to which people get what they deserve, can go from rags to riches, or become president– it is also not “just” a dream, since net incomes or rewards are truly more closely tied to merit than in a more redistributive “Realistic Pessimism” equilibrium.<sup>23</sup> Furthermore, this (endogenously) shared ideology has important growth and ex-ante welfare benefits, since it improves individuals’ deficient motivation to effort. Its net value to the poor is much more ambiguous, since they receive less transfers, and are more likely to be stigmatized. [To be completed]

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<sup>23</sup>It should also be easy to extend the model so that even the pre-redistribution return to effort is higher in the first equilibrium. This will occur, for instance, if agents’ efforts are complements in production. [To be done].

## Appendix

### Proof of Proposition 1

Let us first make explicit the values of the function  $\Gamma(\mu; r, \lambda)$  for the two posteriors that agent will hold in equilibrium. When  $\hat{\sigma}^i = L$ , we have  $\hat{\Gamma}^i = \Gamma(0; r, \lambda) = \theta_L^2 + (1 - \lambda)\theta_L(\theta(r) - \theta_L) > \theta_L^2$ . When  $\hat{\sigma}^i = \emptyset$ , we have

$$\begin{aligned}\hat{\Gamma}^i &= \Gamma(r; r, \lambda) = r\theta_H\theta(r) + (1 - r)\theta_L(\lambda\theta_L + (1 - \lambda)\theta(r)) \\ &= \theta(r) [r\theta_H + (1 - r)\theta_L] + (1 - r)\theta_L [\lambda\theta_L - \lambda\theta(r)] \\ &= \theta(r)^2 - \lambda(1 - r)\theta_L [\theta(r) - \theta_L] < \theta(r)^2.\end{aligned}\tag{A.1}$$

1) *Proof of concavity:* we have

$$\begin{aligned}\frac{\partial V^i}{\partial \tau} &\equiv \bar{\pi} - \pi^i + (1 - 2\tau)a\beta\hat{\Gamma}^i - \left(2 - \frac{\beta}{\gamma}\right)a\beta(1 - \tau) \left(\hat{\theta}^i\right)^2, \\ \frac{\partial^2 V^i}{\partial \tau^2} &= a\beta \left[ (2 - \beta/\gamma) \left(\hat{\theta}^i\right)^2 - 2\hat{\Gamma}^i \right]\end{aligned}$$

The function  $V^i$  is concave in  $\tau$  if  $(2 - \beta/\gamma) \left(\hat{\theta}^i\right)^2 < 2\hat{\Gamma}^i$ , meaning that:

$$(2 - \beta/\gamma) (\mu^i\theta_H + (1 - \mu^i)\theta_L)^2 < 2 [\mu^i\theta_H\theta(r) + (1 - \mu^i)\theta_L(\lambda\theta_L + (1 - \lambda)\theta(r))].$$

Since the difference between the left- and right-hand sides is quadratic and convex in  $\mu^i$ , it only needs to be checked at the boundaries of the range of beliefs  $[0, r]$  achievable in equilibrium. For  $\mu^i = 0$  we get  $(2 - \beta/\gamma) (\theta_L)^2 < 2\theta_L [\lambda\theta_L + (1 - \lambda)\theta(r)]$ , which trivially holds. For  $\mu^i = r$ , we require that:

$$\begin{aligned}(2 - \beta/\gamma) \theta(r)^2 &\leq 2 [r\theta_H\theta(r) + (1 - r)\theta_L(\lambda\theta_L + (1 - \lambda)\theta(r))] \\ &= 2 [(r\theta_H + (1 - r)\theta_L) \theta(r) - (1 - r)(1 - \lambda)\theta_L(\theta(r) - \theta_L)] \\ &= 2 [\theta(r)^2 - (1 - r)(1 - \lambda)\theta_L(\theta(r) - \theta_L)] \iff \\ 2(1 - r)(1 - \lambda)\theta_L(\theta(r) - \theta_L) &\leq (\beta/\gamma) \theta(r)^2 \iff \\ 2r(1 - r)(1 - \lambda)\theta_L(\theta_H - \theta_L) &\leq (\beta/\gamma) (r\theta_H + (1 - r)\theta_L)^2,\end{aligned}$$

Since  $r(1 - r) \leq 1/4$ , it is sufficient that:

$$\theta_H - \theta_L \leq 2(\beta/\gamma) \theta_L,\tag{A.2}$$

which is ensured by the first part of Assumption (1). We now examine how agents' preferred tax rates rank, as functions of their endowments and beliefs. ||

2) *Proof that  $T_{\varnothing}(\pi_0; \lambda, r) < T_L(\pi_0; \lambda, r)$  :* For any  $\pi$ ,  $T_{\varnothing}(\pi; \lambda, r) < T_L(\pi; \lambda, r)$  if and only if  $1 - T_L(\pi; \lambda, r) < 1 - T_{\varnothing}(\pi, r; \lambda, r)$ , or:

$$\frac{\pi - \bar{\pi} + a\beta\Gamma(0)}{a\beta [2\Gamma(0) - (2 - \beta/\gamma)\theta(0)^2]} < \frac{\pi - \bar{\pi} + a\beta\Gamma(r)}{a\beta [2\Gamma(r) - (2 - \beta/\gamma)\theta(r)^2]}, \quad (\text{A.3})$$

which is equivalent to:

$$\left(\frac{\bar{\pi} - \pi}{a\beta}\right) \left[ \left(2 - \frac{\beta}{\gamma}\right) (\theta(r)^2 - \theta_L^2) - 2(\Gamma(r) - \Gamma(0)) \right] < \left(2 - \frac{\beta}{\gamma}\right) [\theta(r)^2\Gamma(0) - \theta(0)^2\Gamma(r)]. \quad (\text{A.4})$$

Now, note that:

$$\begin{aligned} \Gamma(r) - \Gamma(0) &= \theta(r)^2 - \theta_L^2 - \lambda(1-r)\theta_L(\theta(r) - \theta_L) - (1-\lambda)\theta_L(\theta(r) - \theta_L) \\ &= r(\Delta\theta) [\theta(r) + \theta_L - (1-\lambda r)\theta_L] = r(\Delta\theta) [(1+\lambda r)\theta_L + r(\Delta\theta)] \end{aligned} \quad (\text{A.5})$$

and that:

$$\begin{aligned} \theta(r)^2\Gamma(0) - \theta(0)^2\Gamma(r) &= \theta_L\theta(r)^2 [\theta_L + (1-\lambda)(\theta(r) - \theta_L)] - \theta_L^2 [\theta(r)^2 - \lambda(1-r)\theta_L(\theta(r) - \theta_L)] \\ &= \theta_L(\theta(r) - \theta_L) [(1-\lambda)\theta(r)^2 + \lambda(1-r)\theta_L^2]. \\ &= r\theta_L(\Delta\theta) [(1-\lambda)\theta(r)^2 + \lambda(1-r)\theta_L^2] \end{aligned} \quad (\text{A.6})$$

Therefore, condition (A.3) takes the form:

$$\begin{aligned} \left(2 - \frac{\beta}{\gamma}\right) \theta_L [(1-\lambda)\theta(r)^2 + \lambda(1-r)\theta_L^2] &> \left[ \left(2 - \frac{\beta}{\gamma}\right) (\theta(r) + \theta_L) - 2(1+\lambda r)\theta_L - 2r(\Delta\theta) \right] \\ &\quad \times \left(\frac{\bar{\pi} - \pi}{a\beta}\right) \\ &= \left[ \left(2 - \frac{\beta}{\gamma}\right) (2\theta_L + r(\Delta\theta)) - 2(1+\lambda r)\theta_L - 2r(\Delta\theta) \right] \\ &\quad \times \left(\frac{\bar{\pi} - \pi}{a\beta}\right) \\ &= \left[ 2\left(1 - \lambda r - \frac{\beta}{\gamma}\right) \theta_L - \left(\frac{\beta}{\gamma}\right) r(\Delta\theta) \right] \left(\frac{\bar{\pi} - \pi}{a\beta}\right). \end{aligned} \quad (\text{A.7})$$

If the term in brackets on the right-hand side is negative –this always occurs, in particular, when  $\gamma = \beta$ – the condition automatically holds for the poor, since for them  $\bar{\pi} - \pi_1 > 0$ . When the right-hand side is positive (this only occurs when  $\gamma = 1$ ) the condition always holds for the rich ( $\bar{\pi} - \pi_0 < 0$ ), implying that  $T_{\varnothing}(\pi_1; \lambda, r) < T_L(\pi_1; \lambda, r)$ . The claim to be shown, however, pertains to the poor. In order to show that

$$F(r, \lambda) \equiv \left(2 - \frac{\beta}{\gamma}\right) \theta_L [(1-\lambda)\theta(r)^2 + \lambda(1-r)\theta_L^2] - \left[ 2\left(1 - \lambda r - \frac{\beta}{\gamma}\right) \theta_L - \left(\frac{\beta}{\gamma}\right) r(\Delta\theta) \right] \left(\frac{\bar{\pi} - \pi_0}{a\beta}\right),$$

is always positive, let us first observe that, for given  $\lambda$ , this is a convex, quadratic function in  $r$ , with:

$$\begin{aligned}\frac{\partial F(r, \lambda)}{\partial r} &= \left(2 - \frac{\beta}{\gamma}\right) \theta_L [2(1 - \lambda)\theta(r)r(\Delta\theta) - \lambda\theta_L^2] + \left[2\lambda\theta_L + \left(\frac{\beta}{\gamma}\right)r(\Delta\theta)\right] \left(\frac{\bar{\pi} - \pi_0}{a\beta}\right) \\ &> 2\lambda\theta_L \left[\left(\frac{\bar{\pi} - \pi_0}{a\beta}\right) - \left(1 - \frac{\beta}{2\gamma}\right)\theta_L^2\right] > 0,\end{aligned}$$

by the first inequality in the second condition of Assumption 1. Therefore  $F(r, \lambda) > 0$  for all  $r \in [0, 1]$  if and only if:  $F(0, \lambda) > 0$ , which is equivalent to

$$\left(1 - \frac{\beta}{2\gamma}\right)\theta_L^2 > \left(1 - \frac{\beta}{\gamma}\right)\left(\frac{\bar{\pi} - \pi_0}{a\beta}\right), \quad (\text{A.8})$$

Since  $(1 - \beta/2\gamma)/(1 - \beta/\gamma) > 1$ , this inequality is ensured by the second inequality in the second condition of Assumption 1.  $\parallel$

3) *Proof that  $T_L(\pi_0; \lambda, r) > 0$* : this is equivalent to  $1 - T(\pi_0, 0; \lambda, r) < 1$ , or by (11):

$$\begin{aligned}\frac{\pi_0 - \bar{\pi}}{a\beta} + \Gamma(0) &< 2\Gamma(0) - (2 - \beta/\gamma)\theta(0)^2 \iff \\ \frac{\bar{\pi} - \pi_0}{a\beta} &> \theta_L [(2 - \beta/\gamma)\theta_L - (\theta_L + (1 - \lambda)r(\Delta\theta))] \iff \\ \frac{\bar{\pi} - \pi_0}{a\beta} &> \theta_L [(1 - \beta/\gamma)\theta_L - (1 - \lambda)r(\Delta\theta)].\end{aligned}$$

A sufficient condition is that:

$$\frac{\bar{\pi} - \pi_0}{a\beta} > \left(1 - \frac{\beta}{\gamma}\right)\theta_L^2.$$

It is automatically satisfied when  $\gamma = \beta$ , and in any case is ensured by the second condition in Assumption 1.  $\parallel$

4) *Proof that  $T_L(\pi_0; \lambda, r) < 1$* : this is equivalent to  $1 - T(\pi_0, 0; \lambda, r) > 0$ , or by (11):

$$\frac{\bar{\pi} - \pi_0}{\beta a} < \Gamma(0) = \theta_L [(1 - \lambda)\theta(r) + \lambda\theta_L],$$

for which it is sufficient that  $\bar{\pi} - \pi_0 < \beta a \theta_L^2$ , which is ensured by the second condition in Assumption 1.  $\parallel$

5) *Proof that  $T_{\varnothing}(\pi_1; \lambda, r) < 0$* : by (11), this is equivalent to:

$$\frac{\pi_1 - \bar{\pi}}{a\beta} > \Gamma(r) - (2 - \beta/\gamma)\theta(r)^2 = \Gamma(r) - \theta(r)^2 - (1 + \beta/\gamma)\theta(r)^2,$$

which holds automatically since  $\theta(r)^2 > \Gamma(r)$ .  $\parallel$

6) Proof that agents  $i$ 's preferred tax rates is  $T_L(\pi^i; \lambda, r)$  or  $T_\emptyset(\pi^i; \lambda, r)$ , depending on  $\hat{\sigma}^i = L, \emptyset$  : by concavity of the objective function, we have:

$$\tau^i = \min \{T(\pi, \mu^i; \lambda, r), 1\}.$$

(If  $\tau$  was constrained to be nonnegative, we would have instead  $\tau^i = \max \{ \min \{T(\pi, \mu^i; \lambda, r), 1\}, 0 \}$  ; this would make little difference to the results). Furthermore, we have established that:

$$T_\emptyset(\pi_1; \lambda, r) < T_\emptyset(\pi_0; \lambda, r) < T_L(\pi_0; \lambda, r) < 1 \quad (\text{A.9})$$

$$\max \{T_L(\pi_1; \lambda, r), 0\} < T_L(\pi_0; \lambda, r), \quad (\text{A.10})$$

so  $T_L(\pi_0; \lambda, r)$  is the largest desired tax rate, and the constraint  $\tau \leq 1$  is never binding in equilibrium. ■

### Proof of Proposition 2

Since  $T_L(\pi_1; \underline{\lambda}, \underline{r}) < T_L(\pi_0; \underline{\lambda}, \underline{r})$  and  $T_\emptyset(\pi_0; \underline{\lambda}, \underline{r}) < T_L(\pi_0; \underline{\lambda}, \underline{r})$  by Proposition 1, it will be sufficient for  $\underline{\tau} < \bar{\tau}$  that  $T_L(\pi_0; \lambda, r)$  be increasing in  $(\lambda, r)$  for all  $(\lambda, r)$  satisfying (20) or, equivalently, that

$$\begin{aligned} 1 - T_L(\pi_0; \lambda, r) &\equiv \frac{\pi_0 - \bar{\pi} + \beta a \theta_L [\theta_L + (1 - \lambda)r(\theta_H - \theta_L)]}{\beta a \theta_L [(\beta/\gamma)\theta_L + 2(1 - \lambda)r(\theta - \theta_L)]} \\ &= \frac{\pi_0 - \bar{\pi} + \beta a \theta_L [\theta_L + (1 - r)\chi(\theta_H - \theta_L)]}{\beta a \theta_L [(\beta/\gamma)\theta_L + 2(1 - r)\chi(\theta_H - \theta_L)]} \end{aligned}$$

be decreasing in  $r$ , where  $\chi \equiv q/(1 - q)$ . This occurs when

$$\begin{aligned} \left| \begin{array}{cc} \beta a \theta_L & \pi_0 - \bar{\pi} + \beta a \theta_L^2 \\ 2 & (\beta/\gamma)\theta_L \end{array} \right| &= 2(\bar{\pi} - \pi_0) - \left(2 - \frac{\beta}{\gamma}\right) \beta a \theta_L^2 > 0 \iff \\ \left(1 - \frac{\beta}{2\gamma}\right) \theta_L^2 &< \frac{\bar{\pi} - \pi_0}{\beta a}, \end{aligned}$$

hence the result under Assumption 1. ■

### Proof of Proposition 3

Let us examine the incentive to repress (gross of memory costs):

$$\begin{aligned} \tilde{U}(\pi, r, \mu; \lambda, r) - \tilde{U}(\pi, 0, \mu; \lambda, r) &= a\beta(1 - \tau)^2 \theta_L (\theta(r) - \theta_L) - a\beta^2(1 - \tau)^2 \left(\frac{\theta(r)^2 - \theta_L^2}{2}\right) \\ &= a\beta(1 - \tau)^2 (\theta(r) - \theta_L) \left[\theta_L - \beta \left(\frac{\theta(r) + \theta_L}{2}\right)\right] \\ &= a\beta(1 - \tau)^2 (\theta_H - \theta_L) r \left[(1 - \beta)\theta_L - \beta r \left(\frac{\theta_H - \theta_L}{2}\right)\right] \quad (\text{A.11}) \end{aligned}$$

The required equilibrium conditions are therefore that:

$$\beta \underline{r} \left( \frac{\theta_H - \theta_L}{2} \right) < (1 - \beta) \theta_L \quad (\text{A.12})$$

$$(1 - \bar{\tau})^2 \bar{r} \left[ (1 - \beta) \theta_L - \beta \bar{r} \left( \frac{\theta_H - \theta_L}{2} \right) \right] < (1 - \underline{\tau})^2 \underline{r} \left[ (1 - \beta) \theta_L - \beta \underline{r} \left( \frac{\theta_H - \theta_L}{2} \right) \right] \quad (\text{A.13})$$

Since  $(1 - \bar{\tau})^2 < (1 - \underline{\tau})^2$ , the second condition is satisfied when

$$\begin{aligned} (1 - \beta) \theta_L (\bar{r} - \underline{r}) &< \beta (\theta_H - \theta_L) \left( \frac{\bar{r}^2 - \underline{r}^2}{2} \right) \iff \\ (1 - \beta) \theta_L &< \beta \Delta \theta \left( \frac{\bar{r} + \underline{r}}{2} \right). \end{aligned}$$

Thus, the two requirements jointly take the following form:

$$\beta \left( \frac{\Delta \theta}{2} \right) \underline{r} < (1 - \beta) \theta_L < \beta \left( \frac{\Delta \theta}{2} \right) (\bar{r} + \underline{r}). \quad (\text{A.14})$$

Note: may want to how to find a condition that implies it and is independent of  $(\underline{r}, \bar{r})$ . An “obvious” one would be  $(\beta/2)(\Delta\theta) < (1 - \beta)\theta_L < \beta(\Delta\theta)q$ , but this requires  $q > 1/2$ , which we may not want to impose. Alternatively, pick  $\beta$  in the interval:

$$1 + \left( \frac{\Delta \theta}{2\theta_L} \right) \underline{r} < \frac{1}{\beta} < 1 + \left( \frac{\Delta \theta}{2\theta_L} \right) (1 + \underline{r}), \quad (\text{A.15})$$

Finally, when  $\bar{\lambda} < 1$  we also need to check also that no agent want to rehearse the bad news:

$$\tilde{U}_L(\pi_0, \bar{\tau}, \bar{r}; \bar{\lambda}, \bar{r}) - \tilde{U}_L(\pi_0, \bar{\tau}, 0; \bar{\lambda}, \bar{r}) > -m'(1 - \bar{\lambda}), \quad (\text{A.16})$$

$$\tilde{U}_L(\pi_0, \underline{\tau}, \underline{r}; \underline{\lambda}, \underline{r}) - \tilde{U}_L(\pi_0, \underline{\tau}, 0; \underline{\lambda}, \underline{r}) > -m'(1 - \underline{\lambda}). \quad (\text{A.17})$$

Given (25), the second condition is ensured by the fact that the left-hand side is strictly positive. From (A.11), the first condition is satisfied provided that

$$\beta \bar{r} \left( \frac{\Delta \theta}{2} \right) < (1 - \beta) \theta_L, \quad (\text{A.18})$$

or of course if  $m'$  is large enough. Note that (A.18) tightens the double inequality in Assumption (4) still further. With respect to  $m'$ , we probably want to have (or at least not exclude),  $m' < m$  (except perhaps when  $\bar{\lambda}$  is close to 1) ■

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